Packet Type III

Part A

Santa Clara County ARES®/RACES

Last Updated 02-04-2015

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Housekeeping

- Slide corrections available on County web site after the class
- Pen/pencil & paper
- Cell phones & pagers
- Side conversations
- Questions
- Breaks
- Restrooms
- In case of emergency
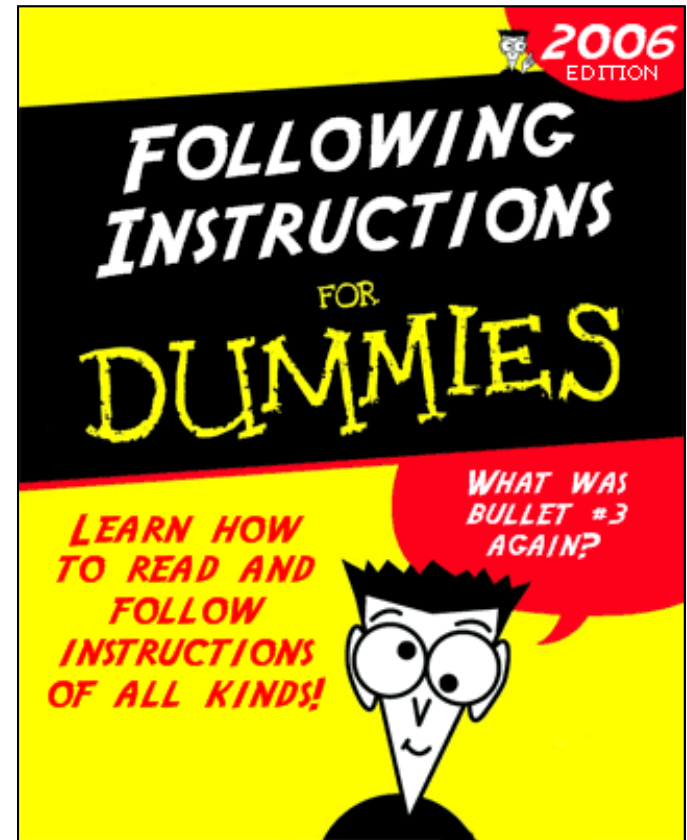
Learning Objectives

The Packet Operator class series is intended to provide basic knowledge and skills for the Mutual Aid Communicator Program Packet Operator qualifications

http://www.scc-ares-races.org/mac

- Type III Part A and Part B
    - Setup and operating skills for an existing packet station
- Type II
    - Advanced operating skills plus construction of a field deployable packet station

When you complete this class, you should be able to

- Describe the purpose and use of packet communications

- Describe the Santa Clara County BBS network

- Describe the components of the baseline packet station

- Assemble, setup, and verify operation of the baseline packet station

- Describe the Outpost and PacFORMS software and their basic use

- Keep records and logs

- But it is more than just sitting in a class on Saturday morning, enjoying a jelly donut!

Documentation to read, understand, and apply

(There will be quizzes)

Agenda

- Role of the Packet Operator

- What and Why of "Packet"

- Santa Clara County BBS Network

- Baseline Packet Station

- Create and Send a Message

- Logs

- Homework!

Packet Operator Qualifications

Role Of The Packet Operator

Packet Operator Type III Capabilities

- Capabilities and services offered

  - **<u>Fully independent operator</u>**

  - Perform the tasks of a Field Communicator III
  - Set-up an existing, pre-installed system which is currently disconnected and stored
  - Operate a PC that has Outpost and PacFORMS pre-installed

Packet Operator Type III Capabilities (continued)

- Capabilities and services offered
  - Configure Outpost options like call sign, tactical call, polling, etc. to the County standard
  - Operate a packet station to send, receive, print, log and track packet messages
  - Properly send three County standard PacFORMS
    - ICS 213 Message Form
    - Logistics Request Form
    - City Scan Form
  - Use alternate addressing techniques
  - Low-to-medium traffic operations

Typical Type III Assignments

- Deployed to locations with low-to-medium traffic and a pre-positioned packet station
  - Small city EOC
  - Small staging area
  - Small aid station or shelter

- MAC Program Handbook contains details of qualification requirements

  www.scc-ares-races.org/mac

PACKET RADIO?

What is Packet Radio?

- One of many digital modes available in Amateur Radio

- Transmitted information is received 100% error free!

- Sends one "packet" of data (envelope + payload) at a time
  - Differs from character-at-a-time modes(PSK31 or RTTY)
  - Adds error checking
  - Envelope contains header at beginning and checksum at end

Header	Payload	CHK

  - Header contains addressing information (to, from)
  - Payload contains the data to be sent
  - Checksum used to determine if packet was received error-free

- Typically operates at 1200 or 9600 baud

Why Packet Radio?

- It's fast
  - Yes, that's right. When there is no Internet, it's fast.
  - 80+ messages sent/received, logged, acknowledged, printed in triplicate, perfectly legible, in < 2 hrs, with 0 errors, by 1 person!

- It's easy
  - Hardware: pre-built cables; straight-forward connections
  - Software: if you can use e-mail, you can use Outpost
  - Procedures: extensive documentation on website

- It's deployable
  - Virtually <u>anywhere</u> in the county and most of surrounding counties; no specialized radios or antennas required

- It fits our served agencies' needs
  - Preferable for long, complex, and/or high volume messages; explicit acknowledgements and tracking

Why Use Packet Radio?

- Packet is ideal for passing complex messages
  - Lists of information
  - Addresses
  - Instructions
  - Complex words

    "turboencabulator", "thymidylate synthetase"
- Messages are transmitted accurately
  - Originator can verify contents before it is sent
  - Reduces transcription errors
- Messages are transmitted quickly
  - Keeps the voice channel clear

What Can We Connect To?

- A packet radio station can connect to a variety of other stations

BBS station

May forward to other BBS stations or the Internet

Personal BBS and Mailbox

Keyboard to Keyboard

TNC   Radio   Antenna

Home, EOC Packet Station

15
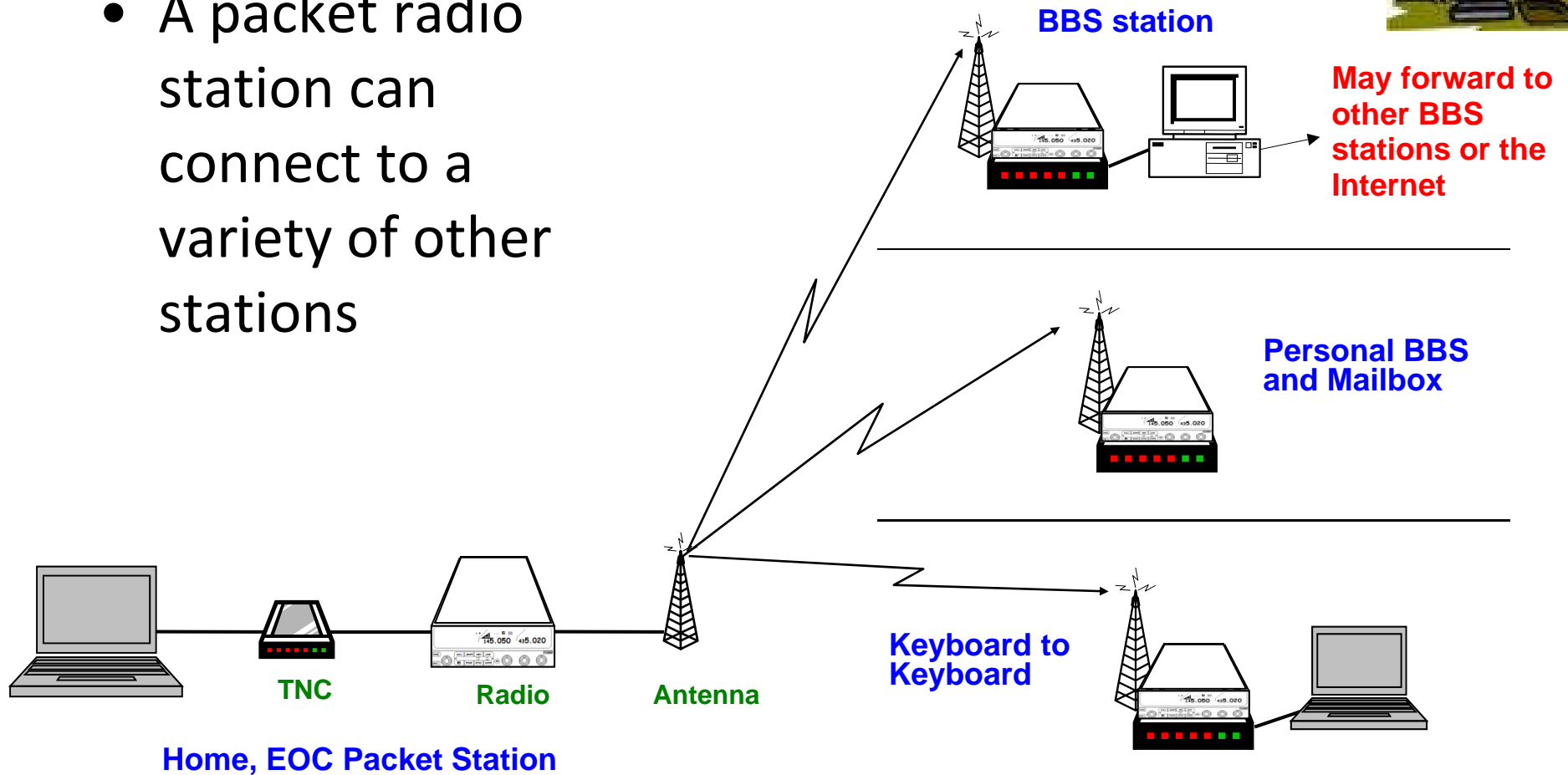
Typical Packet Network Components

Portable, Battery operated,
Deploy anywhere

Fixed Sites (typically)
UPS, Generator

VHF/UHF (typically)

No Internet
Required

Radio

BBS

BBS

TNC
(Modem)

BBS

PC Running
Outpost and
PacFORMS

**Other
Networks**

16
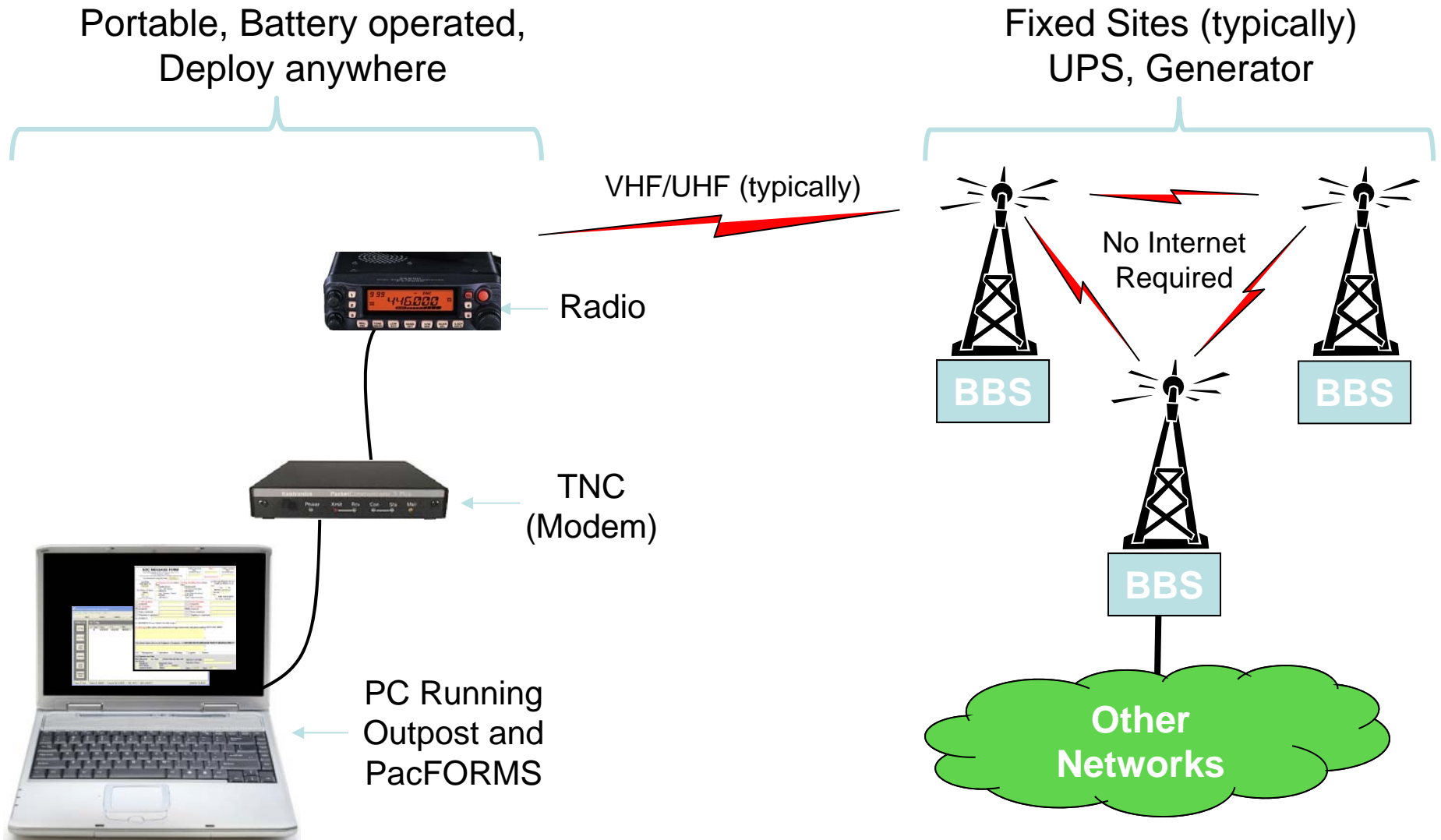
Typical Message Flows

17
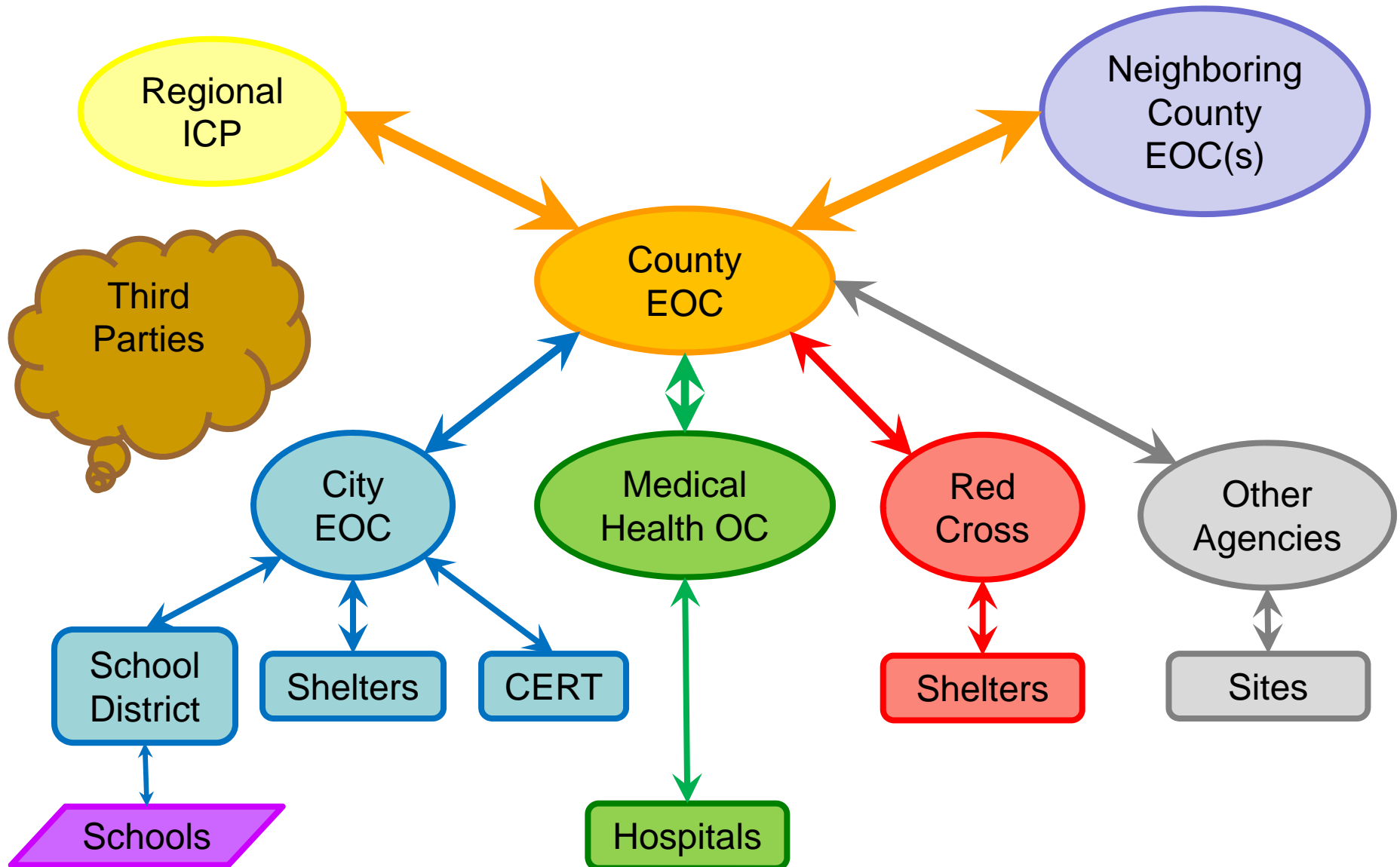
Typical Message Content

- Unstructured Text (informal message)
  - Health and Welfare
  - Simple text messages

- Forms
  - Status
  - Logistics
  - ICS 213
  - Others.....

- Structured Text
  - Lists
  - Addresses
  - Tables

SANTA CLARA COUNTY EMERGENCY PACKET NETWORK STRUCTURE

SCCo BBS Network Operational Concepts

- The network is run like a commercial network
  - ARES®/RACES – It is intended to work in an emergency
  - UPS, backup generators, physical and network security
  - Testing, automated monitoring, user communications
  - Avoid single points of failure
- All BBSs have equivalent functionality, user interface
  - Simplifies user training
  - Provides backup in case of failure
- All cities/agencies can reach at least 2 BBSs
- All users in a city/agency can use the same BBS

W*n*XSC BBS Locations

W4XSC-1

W3XSC-1

W1XSC-1

W2XSC-1

Also: W5XSC-1
Training/Extra BBS
Location Varies
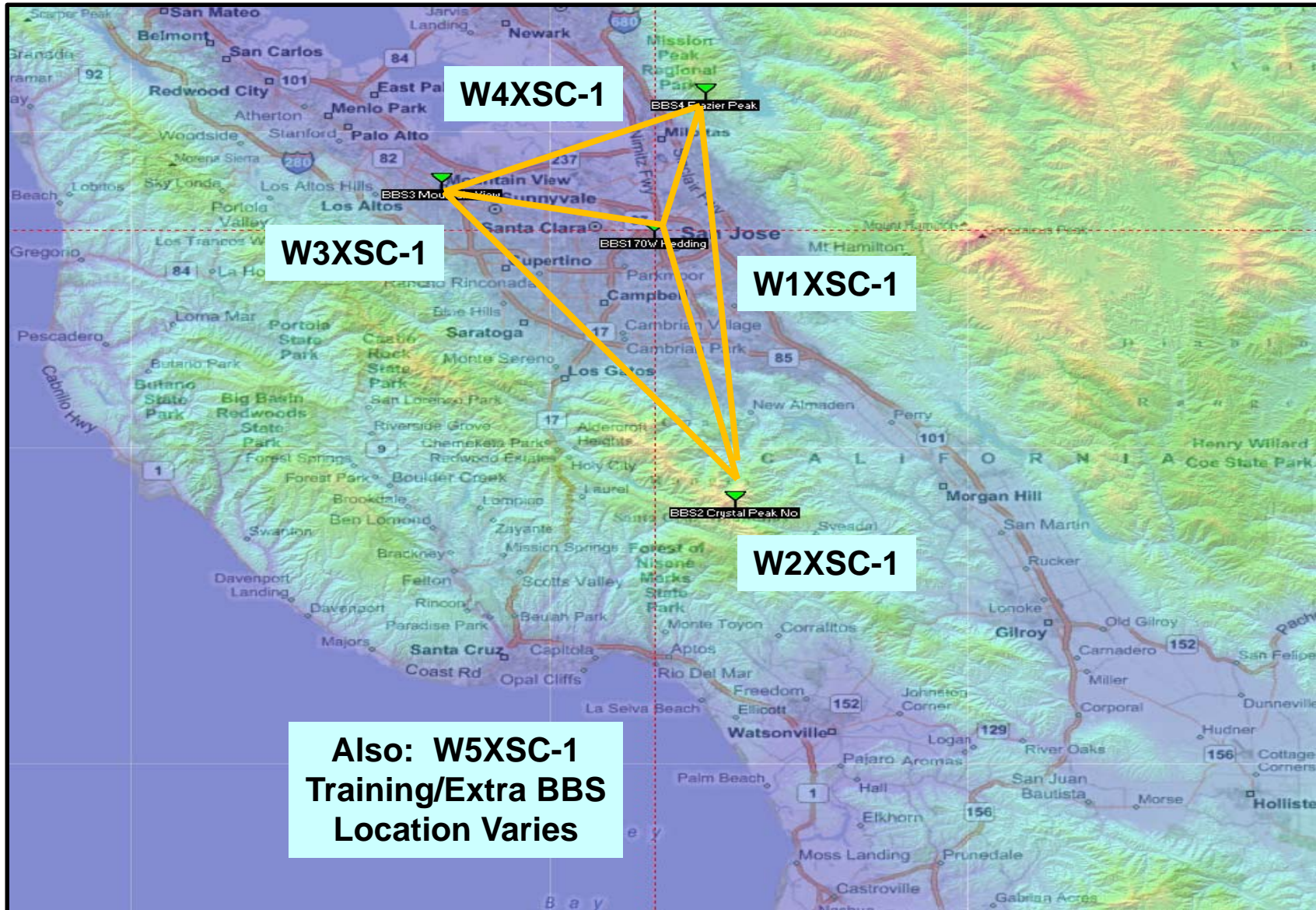
Typical SCCo BBS Block Diagram

AC Backup
- AC Mains
- UPS
- AC PDU
- DC Supply

DC Backup
- Battery
- Charger (PG40S)
- DC PDU

Auto Transfer
- Commercial Power
- Generator

- 2m Radio — Filter
- TNC
- 1.25m Radio — Filter
- TNC
- 70cm Radio — Filter
- TNC
- Triplexor

- Ethernet Switch
- Linux & JNOS
- Firewall/Router
- Intranet
- Internet

Legend:
- AC
- DC
- Serial
- Audio/Ctrl
- RF
- Ethernet

2014 Backbone Connectivity

| 1-WHD W1XSC BBS | 2-CPK W2XSC BBS | 3-MTV W3XSC BBS | 4-FPK W4XSC BBS | 5-CAR SCCo Alt EOC | 6-WYG SCCo EOC | 7-MLP |

1200 bps AX.25

Legend:
— 100+ Mbps
— 10+ Mbps
— 1+ Mbps
— 10+ kbps
— 1+ kbps

2014 Backbone Connectivity

| 1-WHD W1XSC BBS | 2-CPK W2XSC BBS | 3-MTV W3XSC BBS | 4-FPK W4XSC BBS | 5-CAR SCCo Alt EOC | 6-WYG SCCo EOC | 7-MLP |

1200 bps AX.25

Fiber VLAN

Legend:
- 100+ Mbps
- 10+ Mbps
- 1+ Mbps
- 10+ kbps
- 1+ kbps

2014 Backbone Connectivity

| 1-WHD W1XSC BBS | 2-CPK W2XSC BBS | 3-MTV W3XSC BBS | 4-FPK W4XSC BBS | 5-CAR SCCo Alt EOC | 6-WYG SCCo EOC | 7-MLP |

1200 bps AX.25

Ecomm T1

Ecomm 38.4 kbps

Ecomm38.4 kbps

Fiber VLAN

Legend:

━━━ 100+ Mbps
━━━ 10+ Mbps
━━━ 1+ Mbps
━━━ 10+ kbps
━━━ 1+ kbps

2014 Backbone Connectivity

| 1-WHD
W1XSC BBS | 2-CPK
W2XSC BBS | 3-MTV
W3XSC BBS | 4-FPK
W4XSC BBS | 5-CAR
SCCo Alt EOC | 6-WYG
SCCo EOC | 7-MLP |

1200 bps
AX.25

Ecomm T1

Ecomm 38.4 kbps

Ecomm38.4 kbps

5.8 GHz 802.11

5.8 GHz 802.11

5.8 GHz 802.11

Fiber VLAN

Legend:

— 100+ Mbps
— 10+ Mbps
— 1+ Mbps
— 10+ kbps
— 1+ kbps

2014 Backbone Connectivity

Internet (Level 3) — 1-WHD W1XSC BBS

Internet (RazzoLink) — 2-CPK W2XSC BBS

Internet (Cogent) — 3-MTV W3XSC BBS

4-FPK W4XSC BBS

5-CAR SCCo Alt EOC

6-WYG SCCo EOC

Internet (TimeWarner) — 7-MLP

1200 bps AX.25

Ecomm T1

Ecomm 38.4 kbps

Ecomm38.4 kbps

5.8 GHz 802.11

5.8 GHz 802.11

5.8 GHz 802.11

Fiber VLAN

Legend:
- ━━━ 100+ Mbps
- ━━━ 10+ Mbps
- ━━━ 1+ Mbps
- ━━━ 10+ kbps
- ━━━ 1+ kbps

2014 Backbone Connectivity

Next steps:
1. Move to high speed backbone as main BBS-to-BBS transport; 70cm network as backup
2. Add links to high-speed backbone to become fully redundant; 70cm can be repurposed

W*n*XSC Connectivity/Frequencies

- 144 MHz - access
  - User access; typically individuals, some EOCs

- 220 MHz - access
  - User access; typically EOCs, some individuals
  - Forwarding to traditional BBS network

- 440 MHz - forwarding
  - Forwarding between BBSs, no user access
  - Each BBS can reach all other BBSs directly

- 5.8 GHz (unlicensed)
  - Remote access for management/maintenance
  - Future - Use for forwarding between BBSs

- Internet
  - Internet gateway functions at all 4 BBS sites

Electronic Messaging Is Integrated
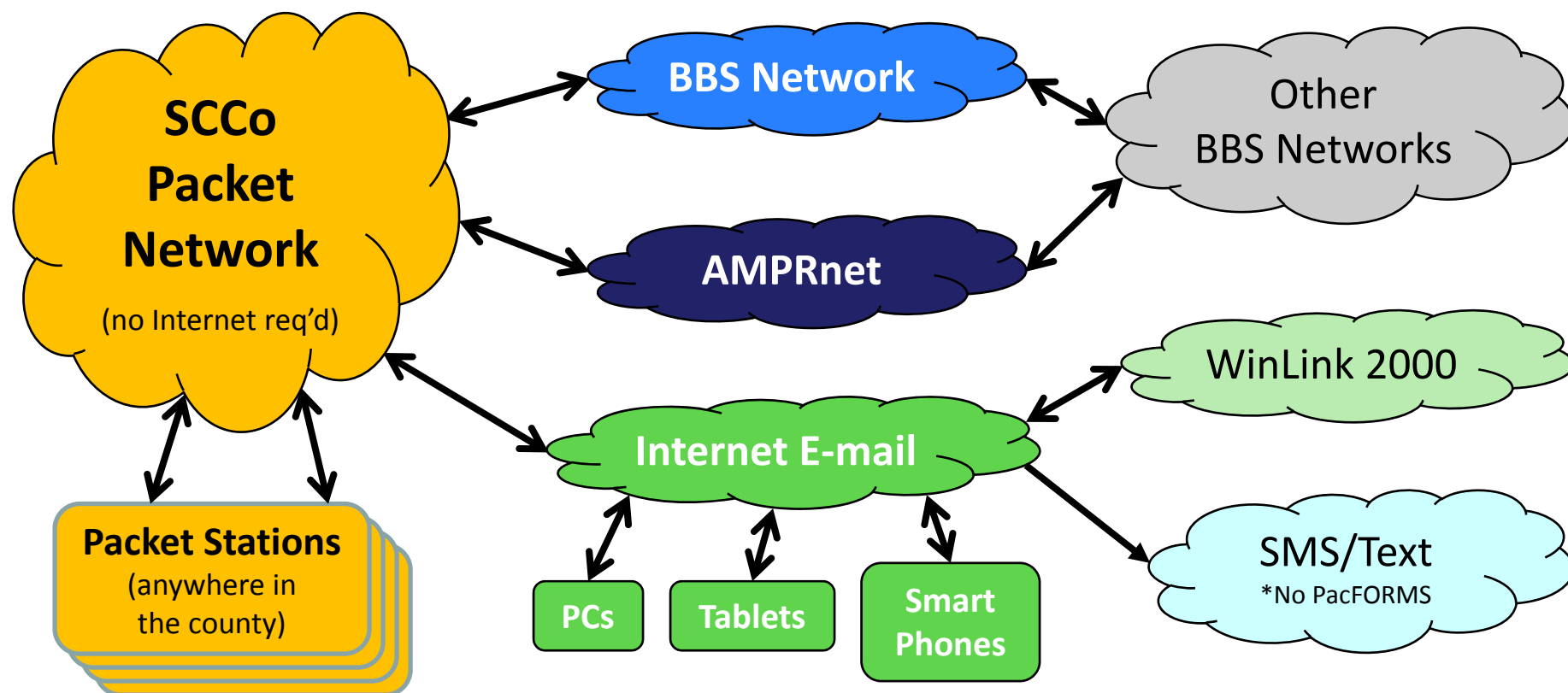
- Gateways to BBS Network, AMPRnet, E-Mail
- 2-way text-only and PacFORMS* messaging with virtually any device

Connectivity Beyond County Borders

- Bay Area / ARRL Silicon Valley Section
  - All surrounding counties can reach at least one Santa Clara County BBS – no Internet required!
    - Alameda County, Contra Costa County, Marin County, Monterey County, San Benito County, San Francisco County, San Mateo County, Santa Cruz County
  - Tactical calls already installed in all SCCo BBSs
  - Anticipated use: mutual aid

Two-way E-mail Gateways

- If an Internet connection is available…..
- Outbound:
  - Address just like any e-mail application:
    - Example: fat.joey@donutsaremylife.com
- Inbound:
  - <callsign>@<bbscall>.ampr.org
  - FCC Call signs: w6xrl4@w2xsc.ampr.org
  - Tactical Call Signs: xndeoc@w4xsc.ampr.org

- Be sure to set e-mail client to plain text mode
  - Otherwise message may be 10x (or more) larger!
- Redundancy
  - Currently using 4 different ISPs in four different parts of the county
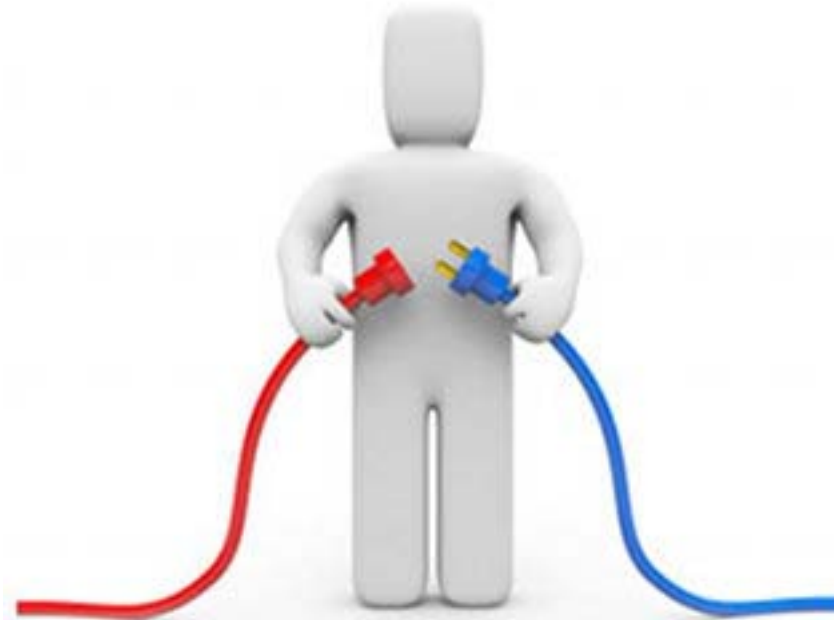
How do I connect?

ACCESSING THE NETWORK

Which BBS?

- Each city/agency has a primary and secondary BBS
  - Selection based on RF coverage, load
- All individuals use the same BBS as their city/agency
- Use primary if possible; otherwise, use secondary
- Why?
  - Simplifies sending a message to someone
  - Best RF coverage for most locations in the city/agency footprint
  - No need to forward intra-agency messages between BBSs
  - Distributes load across all BBSs
- If primary fails, cities/agencies on that BBS are distributed across remaining three BBSs
  - Keeps load distributed, even during a failure

List of Primary & Secondary BBSs

- Primary and Secondary BBSs are listed on the website
  - Look up your city

#	Agency	Prefix	Primary BBS	Secondary BBS
Santa Clara County Cities and Agencies				
1	American Red Cross	ARC	W1XSC	W4XSC
2	CAL FIRE VIPs - Santa Clara Unit	SCU	W2XSC	W1XSC
3	Campbell, City of	CBL	W1XSC	W4XSC
4	Cupertino, City of	CUP	W1XSC	W4XSC
5	Gilroy, City of	GIL	W2XSC	W1XSC
6	Hospitals (all SCCo) & DEOC	HOS	W2XSC	W1XSC
7	Loma Prieta Region	LMP	W1XSC	W4XSC
8	Los Altos, City of	LOS	W3XSC	W1XSC
9	Los Altos Hills, Town of	LAH	W3XSC	W1XSC

http://www.scc-ares-races.org/

Primary & Secondary BBS List

- In an emergency, SCCo web site may not be available
- The same information is also posted in a bulletin on all BBSs
  - Currently located in the "xscperm" area.
- Keep a copy in your Outpost "Archive" folder at all times
  - You may also want to save it as a text file on your PC
- Post it at your EOC or operating position

Current BBS Frequency Assignments

Call Sign	AX.25	User Access	BBS-BBS	Location
W1XSC	W1XSC-1	145.750, 223.620		Santa Clara Co Office Bldg (San Jose)
W2XSC	W2XSC-1	145.730, 223.560		Crystal Peak (South County)
W3XSC	W3XSC-1	144.310, 223.540		Mountain View
W4XSC	W4XSC-1	145.690, 223.600*	223.600	Frazier Peak (above Milpitas)
W5XSC	W5XSC-1	varies	varies	Varies - for training, events, back-up, etc.

- Recommendations
  - EOCs use 220 access (less crowded, eases EOC antenna limitations)
  - Individuals use 2m access (more radio/antenna options)
- Download and print a copy for your Go Kit
- Check web site and bulletins for changes
- When all else fails, use your voice radio to get the information

Tactical Calls

- Tactical Calls are assigned to facilitate message processing
  - Consistency of addresses
  - Independent of operator's FCC call sign

- Once added to BBSs:
  - Packet users can log in with city tactical call signs

- Updates occur approximately once per month

- Tactical calls for your city are available from your EC

- Tactical calls also added for Coastal Region and all surrounding counties

Requesting Tactical Calls

- Agencies can request tactical calls for packet
  - As many as you need; must start with agency tactical prefix
  - Example usage: packet operators deployed to shelter, school, …
  - Instructions: http://www.scc-ares-races.org/packet.html.html
    - "How to Request Tactical Calls"

Coverage Maps Available

http://www.scc-ares-races.org/freqs/packet.html-freqs.html
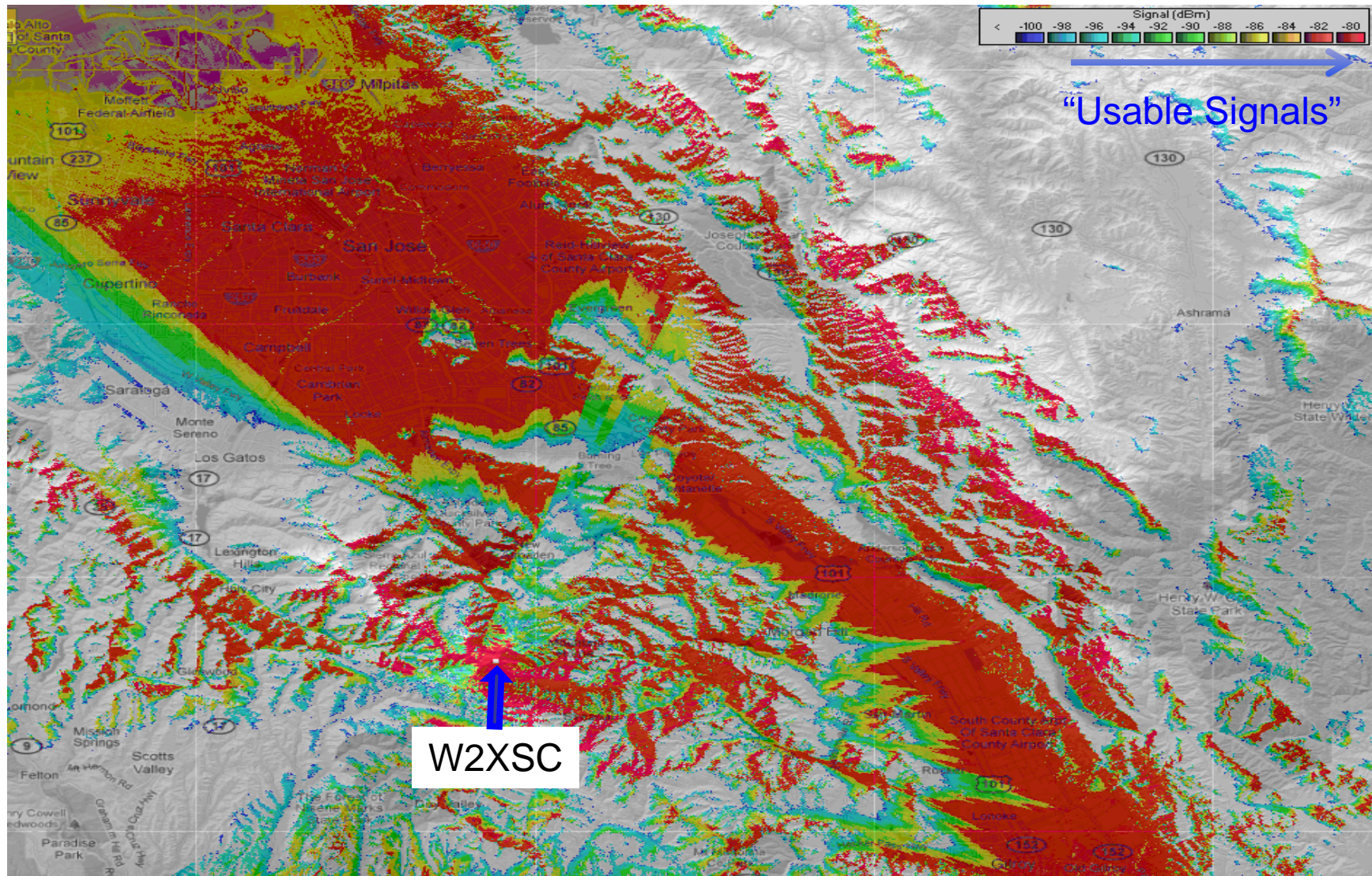
ASSEMBLING A PACKET STATION
(Needed for Type III Qualification)

County Baseline Station

- Baseline station is used for MAC Evaluations

- Hardware
  - Computer/Notebook/Netbook
  - Kantronics KPC-3+ TNC
    - Selected as representative of TNC functions
  - Packet capable radio 25W
  - USB memory stick
  - Cables
  - Printer (optional)

- Software
  - Outpost
  - PacFORMS
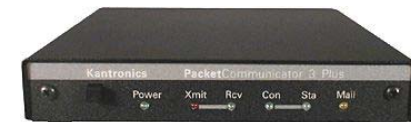
Hardware Selection Highlights

- Radio
  - Mobile style radio –
    - Minimum 25 watts
  - Packet/Data connector
    - Assures easy connection and consistent operation

- Terminal Node Controller (TNC)
  - Reliable, consistent, out of the box operation needed
  - Hardware TNCs preferred
    - County BBSs make extensive use of KPC 3+ TNC
    - KPC 3+ has other features
      - Private BBS, digipeater, node
      - Command line interface (Outpost not needed)

- More info at end of presentation

Type III Scenario

W6XLR4, this is Xanadu EOC

This is W6XLR4, go ahead

W6XLR4, please deploy to Xanadu Community Hospital and set up the on site packet station. Tactical call is XNDHSP. Do you need directions?

W6XSC

Acknowledged. I know the location and will deploy immediately. W6XLR4

"Thinking Out Of The Box"
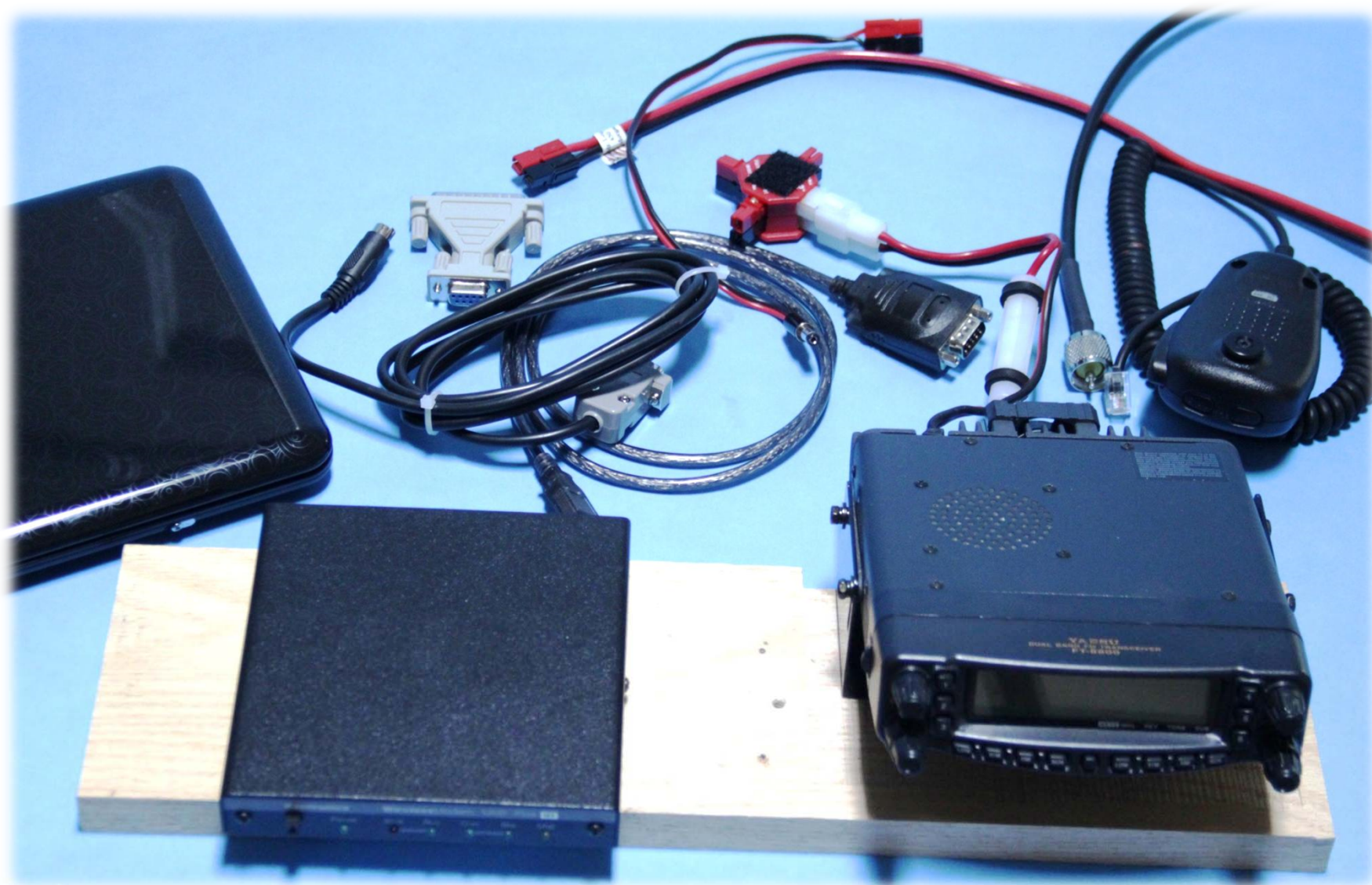
Building The Packet Station

KPC-3 Plus

(connections on back)

Radio (Transceiver) DB-9 (female)

Computer (or GPS) DB-25 (female)

Power 2.1 mm

5-conductor shielded cable

Shielded RS-232 cable

2.1 mm power jack and stranded 2-conductor wire

Bench Power Supply (12 V dc)

Typical station configuration

6 pin mini-DIN

Transceiver

Serial (COM) port DB-9 or DB-25 (male)

Computer

Power-cube: Power adaptor (120 V ac / 12 V dc with cable assembly)

120 V

Connect TNC to PC

Radio Connection

Serial Connection
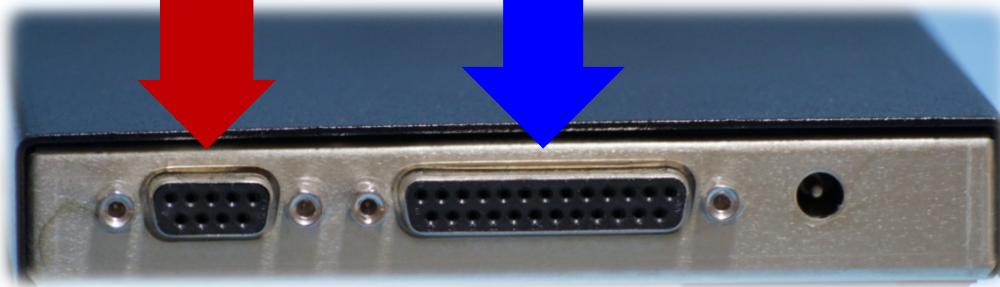
- **Caution – The Radio connector is a DB-9 !**
  - **PTT, Transmit audio, Received Audio (NOT RS-232!)**

- KPC-3+ serial port has a DB-25 connector
  - DB-9 adapter may be needed
- Standard RS-232 serial cable or USB-to-Serial

Connect TNC to Radio

DATA Connector

Combined function connector
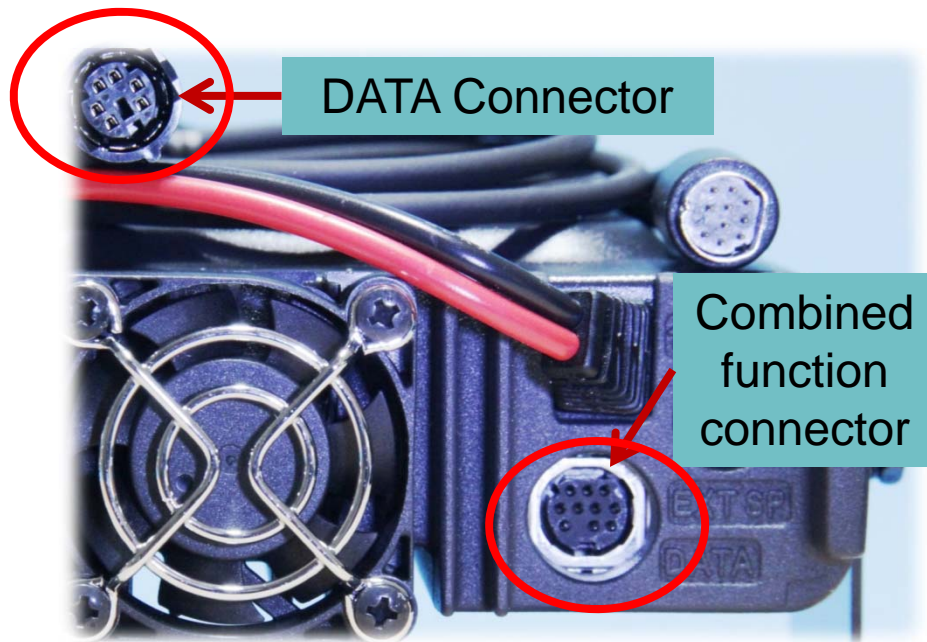
- Most radios have a dedicated 6 pin mini-DIN DATA connector

- Some have a combined 8 pin mini-DIN connector and a breakout cable

- Otherwise you will use the speaker and mike connectors

Connect TNC to Radio
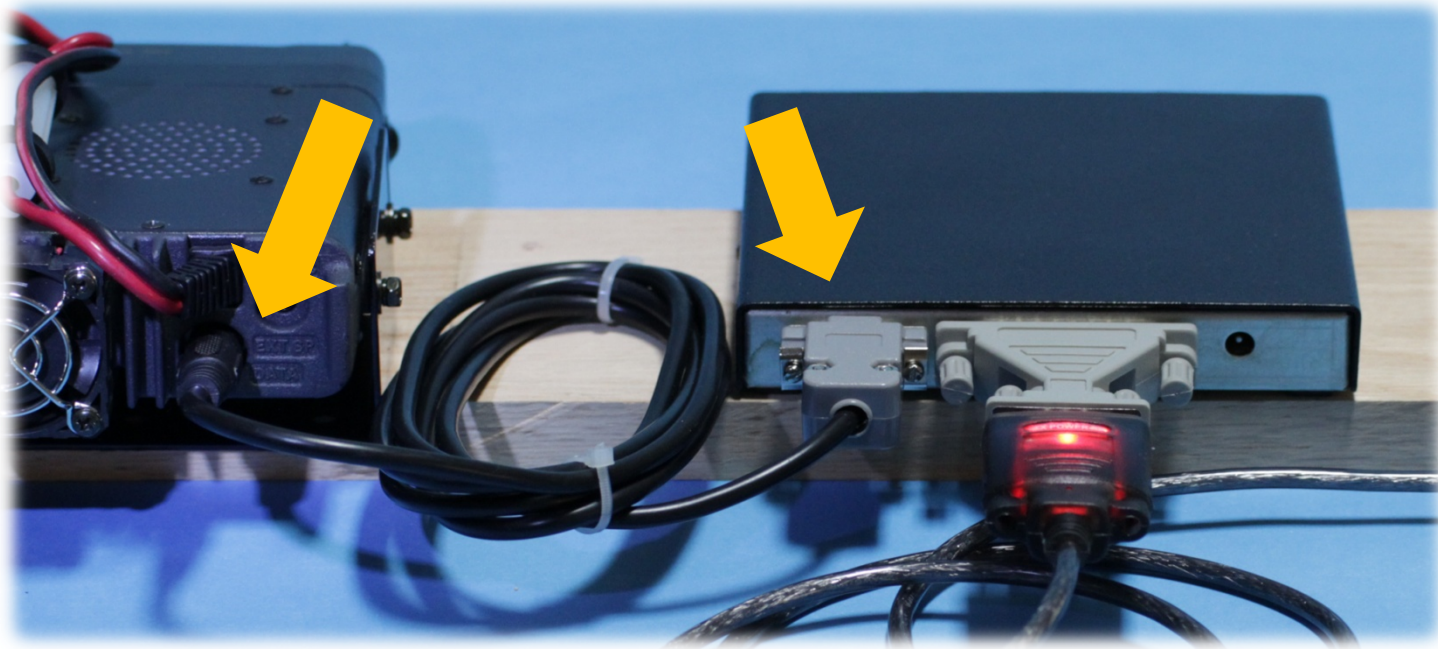
- KPC-3+ has a DB-9 connector
- Radio will have a dedicated "data" connector for packet
    - 6 pin mini-DIN
    - May have to use mic connector and external speaker
- Connect antenna to radio
- Connect power to radio, TNC, and computer

"Got My Act Together"

PC/Laptop

Serial to USB Cable

Audio and PTT Cable

TNC

Radio
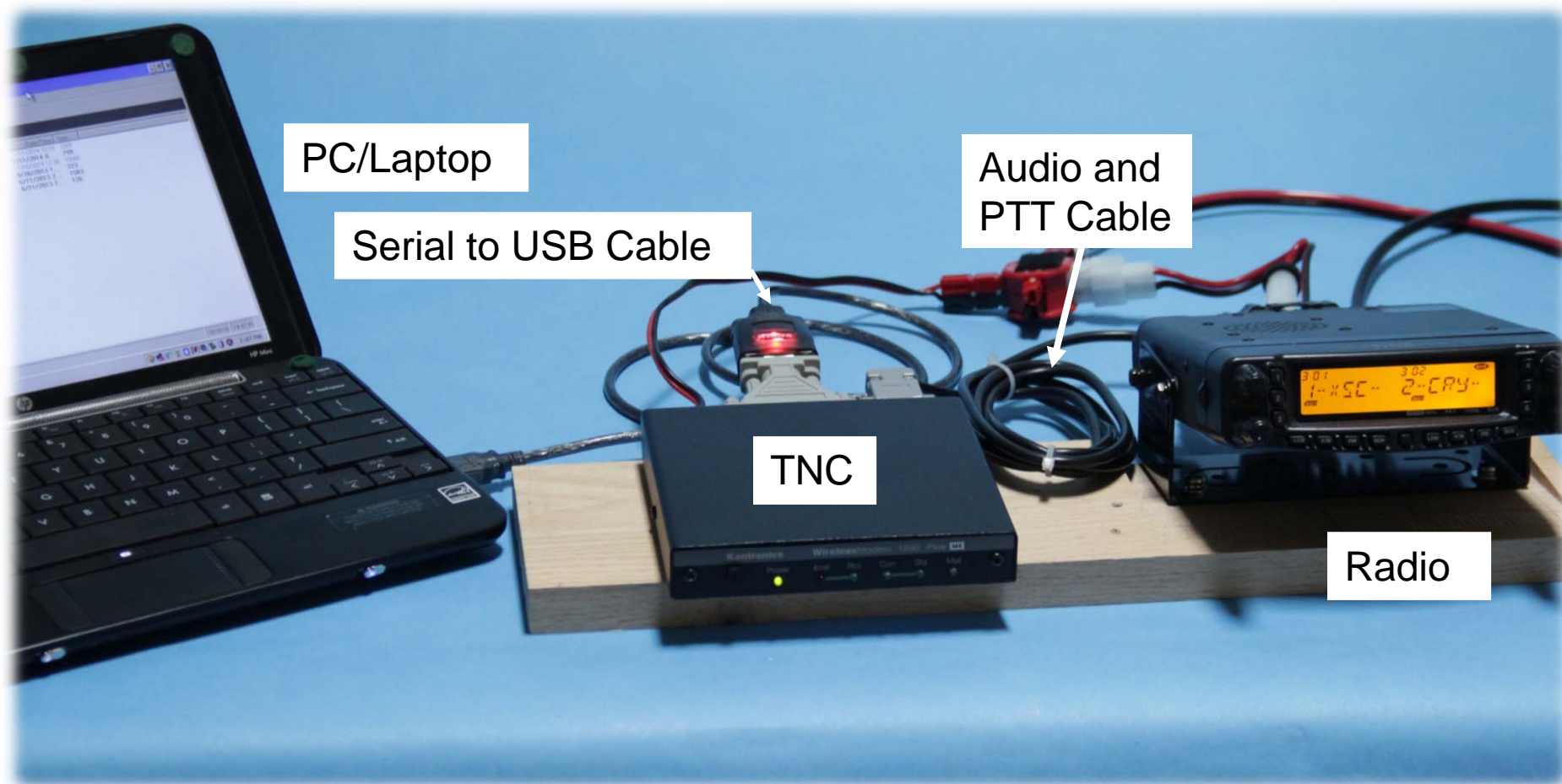
PC Set UP

- Secure a work area suitable for computer use
  - Protected
  - Out of sunlight
  - AC power, if possible
- Set up PC
  - Verify that Outpost and PacFORMS are installed
  - Verify the version
  - Set up user identification and Tactical ID (if needed)
  - Make sure computer date and time are set correctly
  - Verify correct Profile
  - Verify BBS and TNC settings
  - Adjust other settings as needed for the assignment

Radio Settings

- Consult radio manual for packet settings
  - Packet or data mode

  - Packet baud rate – 1200 bps

  - If Dual Receive, which side does Packet use?

  - Simplex

  - No tone or tone squelch

    - Yaesu users - make sure WIRES is off

  - RF squelch/S-meter squelch to minimum

  - Turn off any function that might interrupt radio function

    - Battery save features

  - 25 W or more transmit power

KPC-3+ Set Up Overview

- Use IPSERIAL to communicate with the TNC

  – Verify Com Port settings

  – Verify that TNC "connected" – "`cmd:`" prompt

  – Adjustment of serial connection baud rate may be needed

- Use the Command mode to instruct the TNC

  – Actions to be performed

  – Parameters to be set

  – Diagnostic information

- Commands consist of one word plus data, if needed

- Command with no data shows current setting

KPC-3+ Command Mode Basics

- Prompt is   `cmd:`

- Error message is   `EH?`

- Favorite command is   `HELP`

- Display all parameters   `DISPLAY`

- Before changing a parameter, type the command without data to see the current setting

  `cmd:intface`   **(user typed)**

  `TERMINAL`   **(response)**

- Successful command will show previous setting

  `cmd:maxframe 2`   **(user typed)**

  `MAXFRAME was 4`   **(response)**

Getting The Baud Rate Right

- KPC3+ serial port baud rate must match PC serial port, otherwise gibberish
  - Try 1200 baud, the KPC 3+ default
    - Click DISCONNECT, set com port to 1200, click CONNECT
    - Hard reset sets baud rate to 1200

- If you get *cmd:*
  - Then enter

        cmd:abaud 9600   (user typed)

        abaud was 1200   (response)

        cmd:reset

- In IPSERIAL
  - Click DISCONNECT, set com port to 9600, click CONNECT

Setting Carrier Detect Parameter

- The baseline County packet station uses the KPC software to detect the packet carrier

- Start `IPSERIAL`

- Set Carrier Detect Parameter

  `cmd: INTFACE TERM`   (sets interface mode to expert)

  `cmd: CD SOFTWARE`   (set carrier detect to software)

If your hear noise from the radio and the RCV light is on, carrier detect is not set correctly

If the RCV light is on, you cannot transmit!

Using Calibrate To Set Level

- If things are working, skip this step

- Process to set transmit audio level
  - Listen to your packet signal on another radio
  - Increase the packet audio level and listen for the signal to increase
  - When it stops increasing, reduce the audio level until you hear the packet audio decreasing
    - 1-5 steps, depending on the radio

- SCC-PACKET Yahoo group has a database of XMITLVLs and measured deviations for popular radios

  https://groups.yahoo.com/neo/groups/scc-packet/database

Setting Audio Level – KPC 3+ Example

- Use CALIBRATE

  cmd: calibrate

  CALIBRATE MODE: PRESS M,R,S,T, OR X

- Transmit a SPACE and adjust value (Kantronics example)

  - Press *s*

  - Press '**+**' (increase) or '**-**' (decrease) to set level until no increase is noted, then back it off until it just decreases

    - Depending on the radio, 1-5 steps will be needed

- When done, press *X*

- Use XMITLVL to see the final value. Record it for reference.

  cmd:xmitlvl

  XMITLVL 160

Now for the software…..

Outpost and PacFORMS

What is Outpost?

- A Windows-based packet messaging client with an email-like GUI

- Supports ARES, RACES, and other amateur radio emergency response teams and their need to pass packet traffic

- Automates and manages all message handling between you and your BBS

- Lets you read, delete, create, reply to, or forward messages back to the BBS

- SCCo Packet Installer is available from County web site
  - www.scc-ares-races.org/packet.html

- General purpose version available from Outpost web site
  - www.outpostpm.org

Install Santa Clara County Version

- Combined Installer for Outpost & PacFORMS
  - Unique directory name
    - C:\Program Files\SCCo Packet
  - Does not interfere with general purpose version of Outlook on same machine
- Includes all updates
  - Standard TNC and County BBS setups
  - Standard County user settings
  - Standard County forms
  - Updates will not overwrite user defined settings

Install Outpost and PacFORMS

– Before You Begin…

– Delete PacFORMS folder from Desktop

– Use Windows Explorer and delete the c:\PacFORMS folder

Why Bother?

• Duplicate PacFORMS folders on the desktop are possible

• Future removal of PacFORMS may not complete entirely.
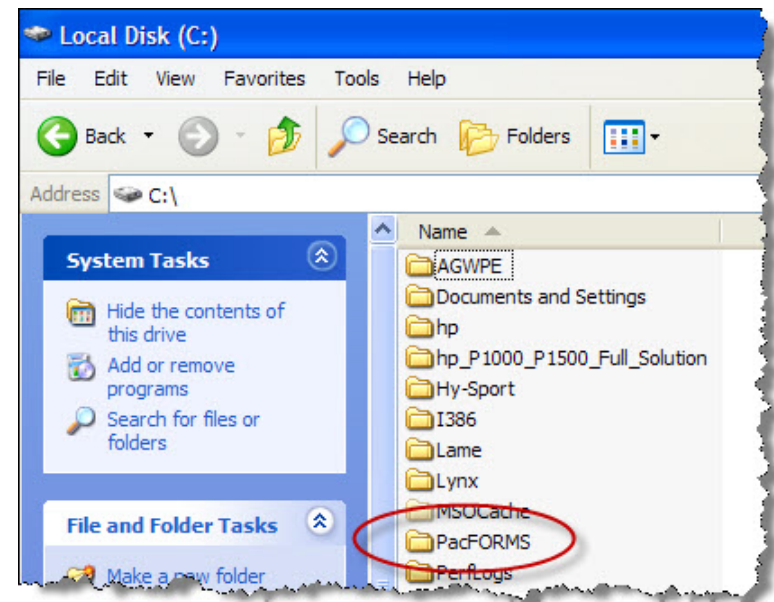
Install Outpost and PacFORMS

Single click install process for Outpost and PacFORMS

Click the defaults

Start   Finished

The Results…

General release version

SCCo release version
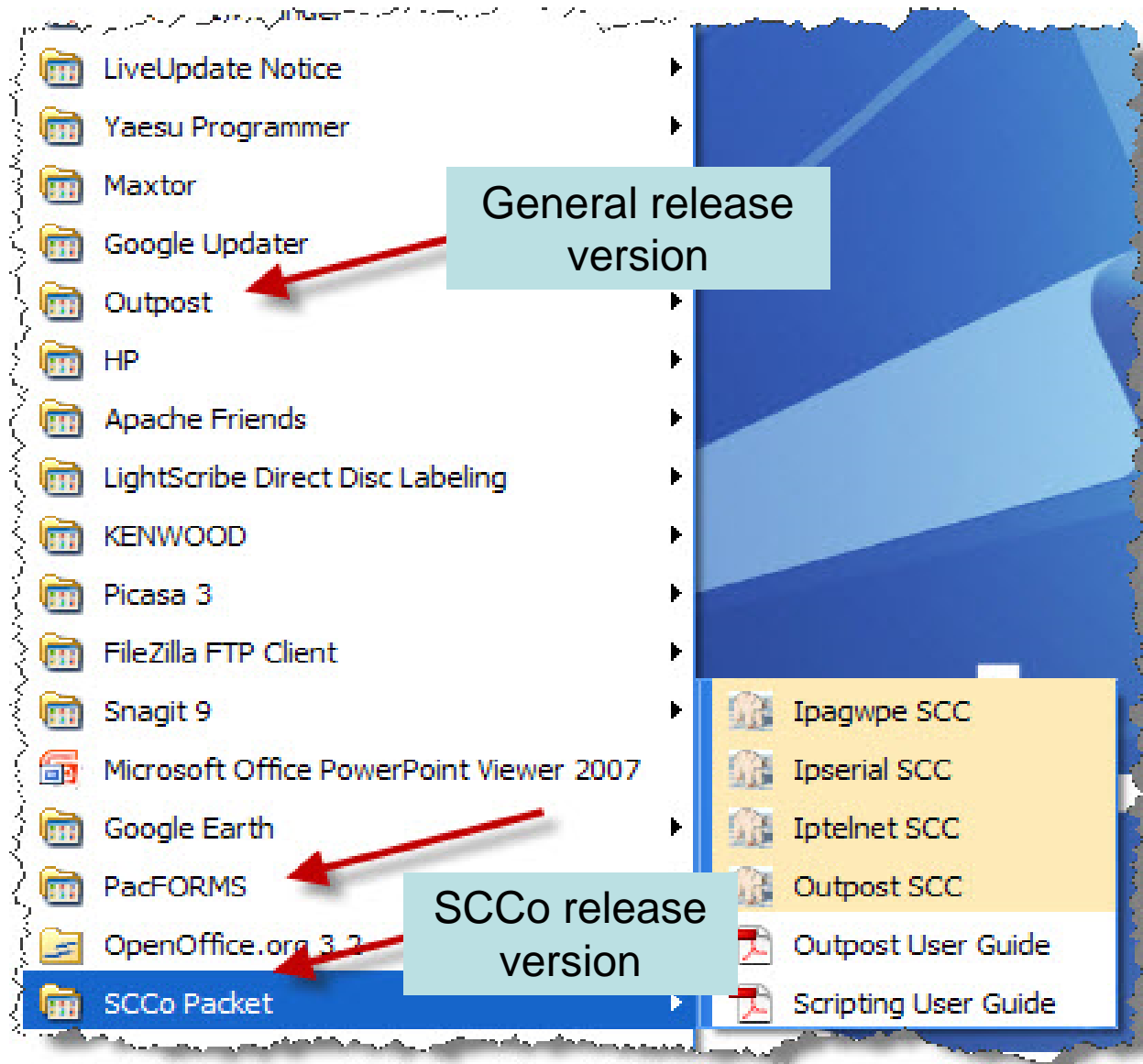
Which Version?

Start up window

Help -> About
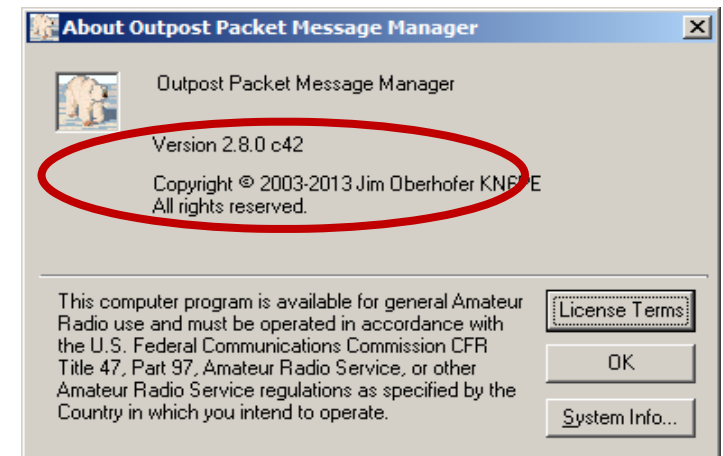
Start > All Programs > SCCo Packet > SCCo Version


```
SCCo-Version.txt - Notepad
File  Edit  Format  View  Help
SCCo Version Information
==========================
This release contains the following:

1. Install:     v70
2. Outpost:     v300v140
3. PacRELEASE:  v40

   Build Date:  27 October 2014

For Outpost release details, do the following
1. Run Outpost
2. From the main menu, press Actions > "View (
3. Double-click on the file "README300.txt"

For PacFORMS release details, see the various
c:\PacFORMS\Docs
```

Or, you can look in Control Panel > Add Remove Programs

Connecting with Ipserial
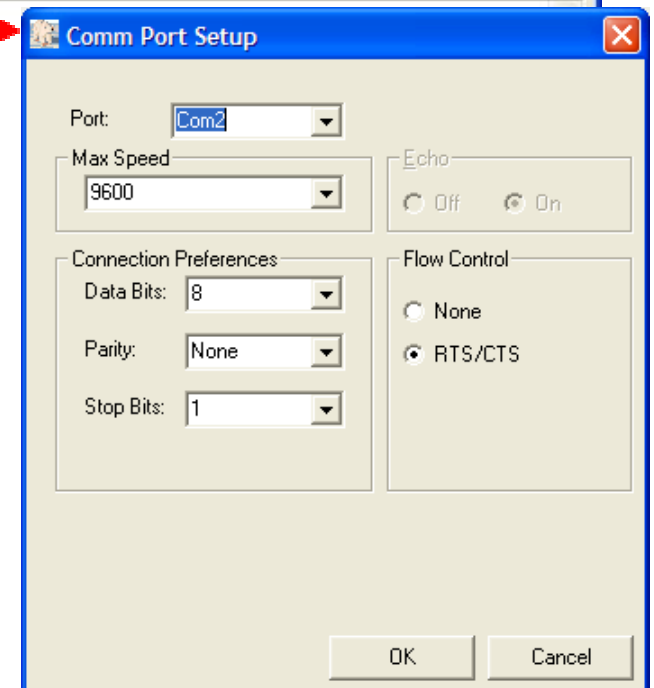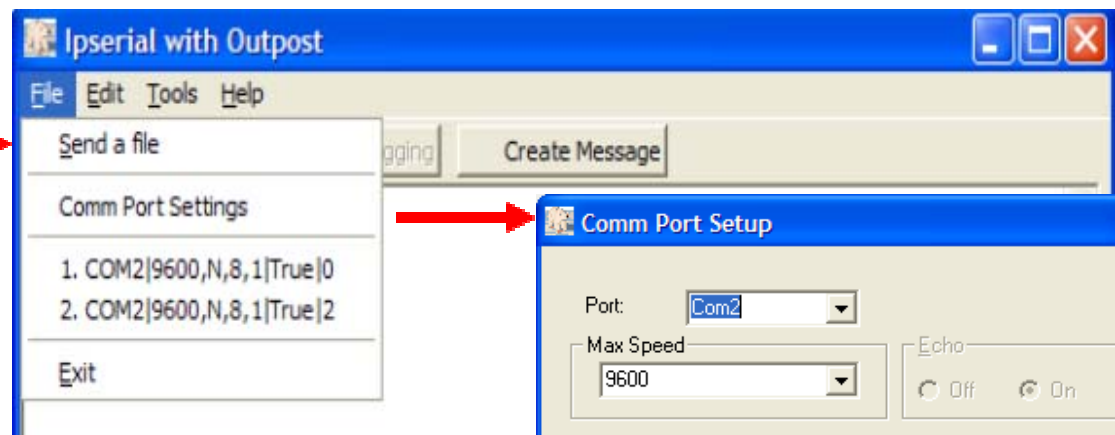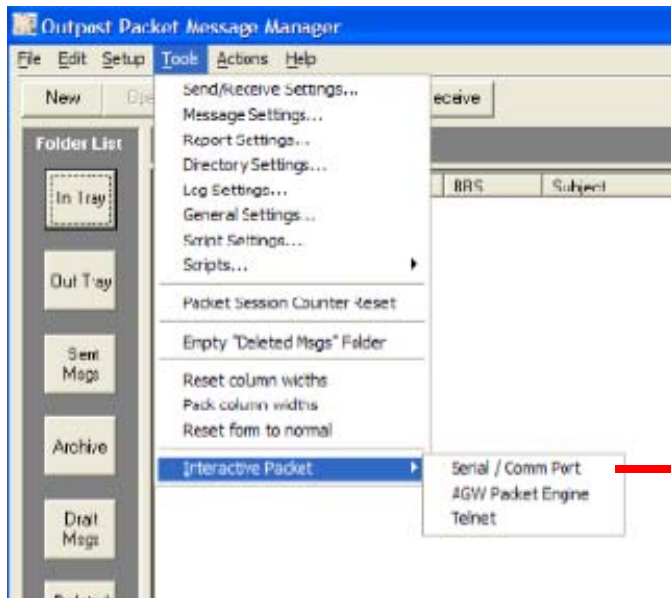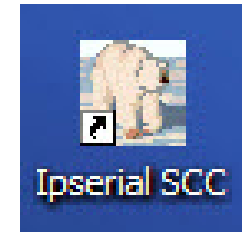
Ipserial

- Way to test connection to TNC
- Also available as Ipserial icon
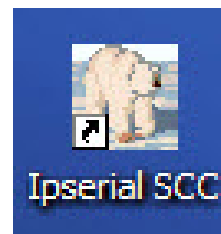
Connecting with Ipserial- Comm Port

- Once serial settings are confirmed
  - Can move settings to or from Outpost
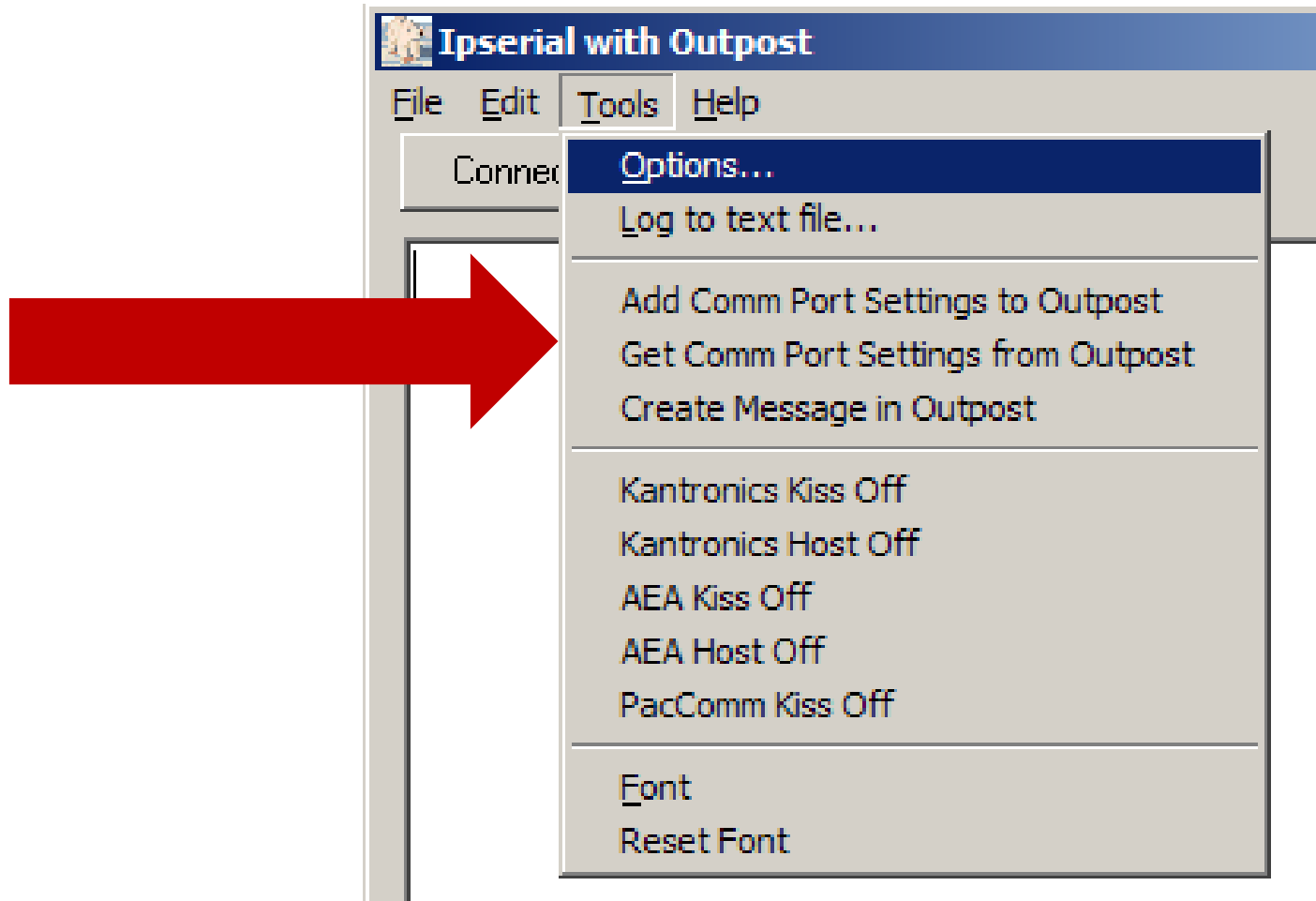
Connecting with Ipserial - KISS Off

- Some other packet applications may not properly exit KISS or HOST mode

- Return to command mode requires sending obscure control characters to the TNC (or else full reset!)

- Ipserial menu options do this for you
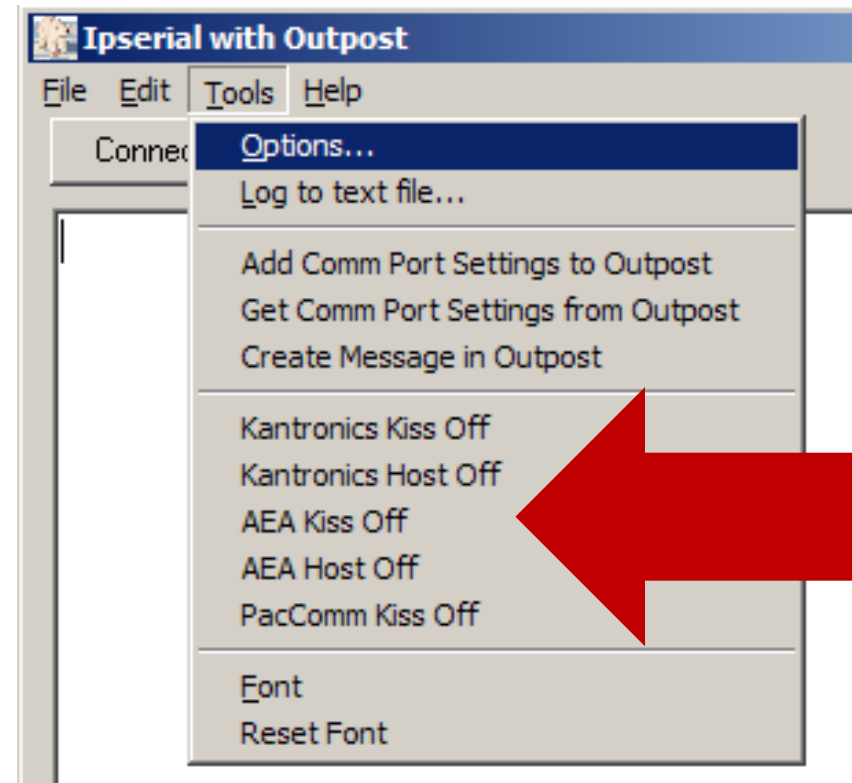
Opening Outpost – User Identification

- If not using a Tactical Call
  - User call sign
    - Your FCC call sign or the agency
  - Name
    - Your full name
  - Message ID
    - 3 letter prefix used in message number
    - Set according to your served agency policy
    - Packet Net Check in – Use your initials
- To change from FCC call to Tactical
  - Click/Unclick - *Use Tactical Call*
  - When fields are greyed out – using FCC call

- When you take over a shift as a Packet Operator, you will need to change User Call sign, and User Name

Station Identification

Identification

Current Profile: **Packet Class**

Legal

User Call Sign: W6XLR4
User Name: Herman Munster
Message ID Prefix: HXM (3 Characters max

Tactical

☐ Use Tactical Call for all BBS interaction

Tactical Call Sign: XNDEOC
Additional ID Text: Xanadu EOC
Message ID Prefix: XND (3 Characters ma

☑ Show this form on startup

Opening Outpost – Using a Tactical Call

- **If Using a Tactical Call**
  - "Use Tactical Call …" is checked Outpost will connect to the BBS using this call sign
- **Fill in Tactical Call Sign**
- **Additional ID Text**
  - Sent along with FCC call sign and tactical call in final ID packet

- **Message ID**
  - 3 letter prefix used in message number
  - Set according to your served agency policy
    - Packet Net Check in
    - Use your initials

- **When starting your shift**
  - Enter your User Call Sign and User Name
  - Verify tactical information

Opening Outpost - PC Time Check

- Old and/or seldom-used PCs are usually not set to the correct time

- Outpost and PacFORMS use PC time

- Causes incorrect and confusing information

- On startup, Outpost displays the current PC time and offers chance to update it
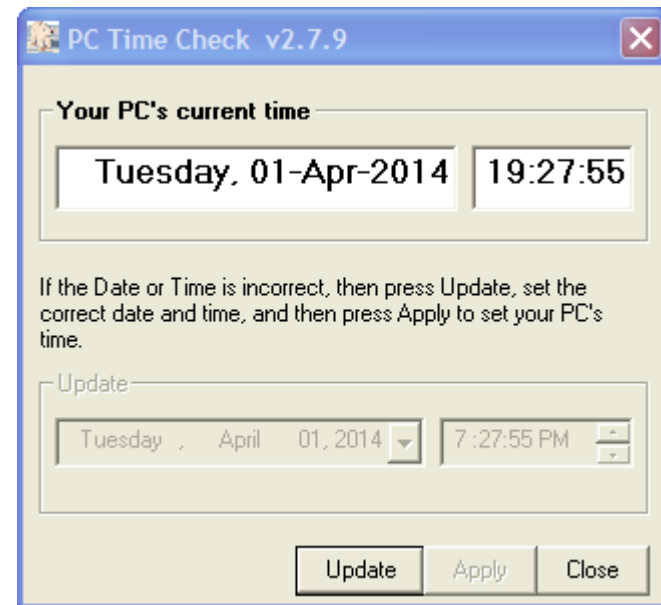
Opening Outpost - Profiles

- Profiles are used to store the Outpost settings under a name
  - The "OUTPOST" profile contains all of the default SCCo settings
    - Ex: Tools menu, Station Identification, BBS selection, TNC selection, etc.
- Switch between profiles without restarting Outpost
- Verify that the Profile is correct
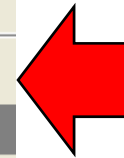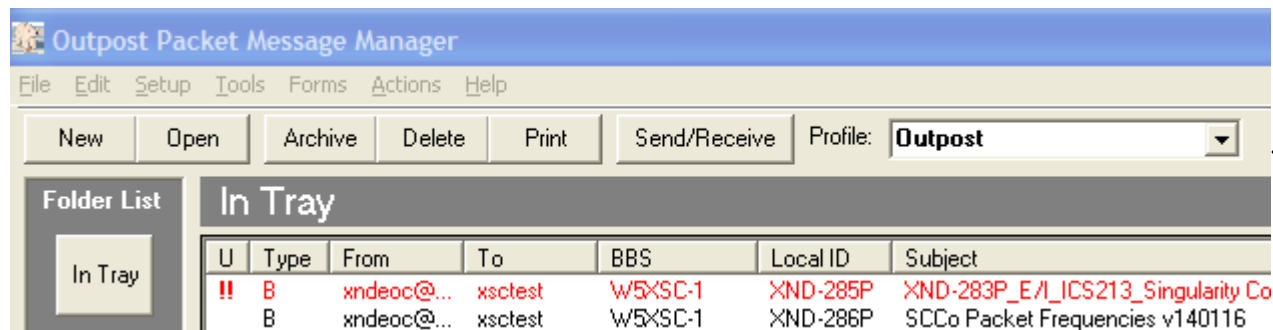
Configuring Outpost - Setup

- All configuration items are under two Menu items

- The "Setup" menu
  - TNCs preconfigured
  - Santa Clara County BBS's preloaded
  - Profiles permit multiple configurations

Outpost Packet Message Manager

File Edit Setup Tools Forms Actions Help

New

TNC...	Ctrl+T
BBS...	Ctrl+B
Identification...	Ctrl+I
Address Book...	
Profiles...	▶
PC Time Check...	

Folder

In Tra

To

Out Tray

73
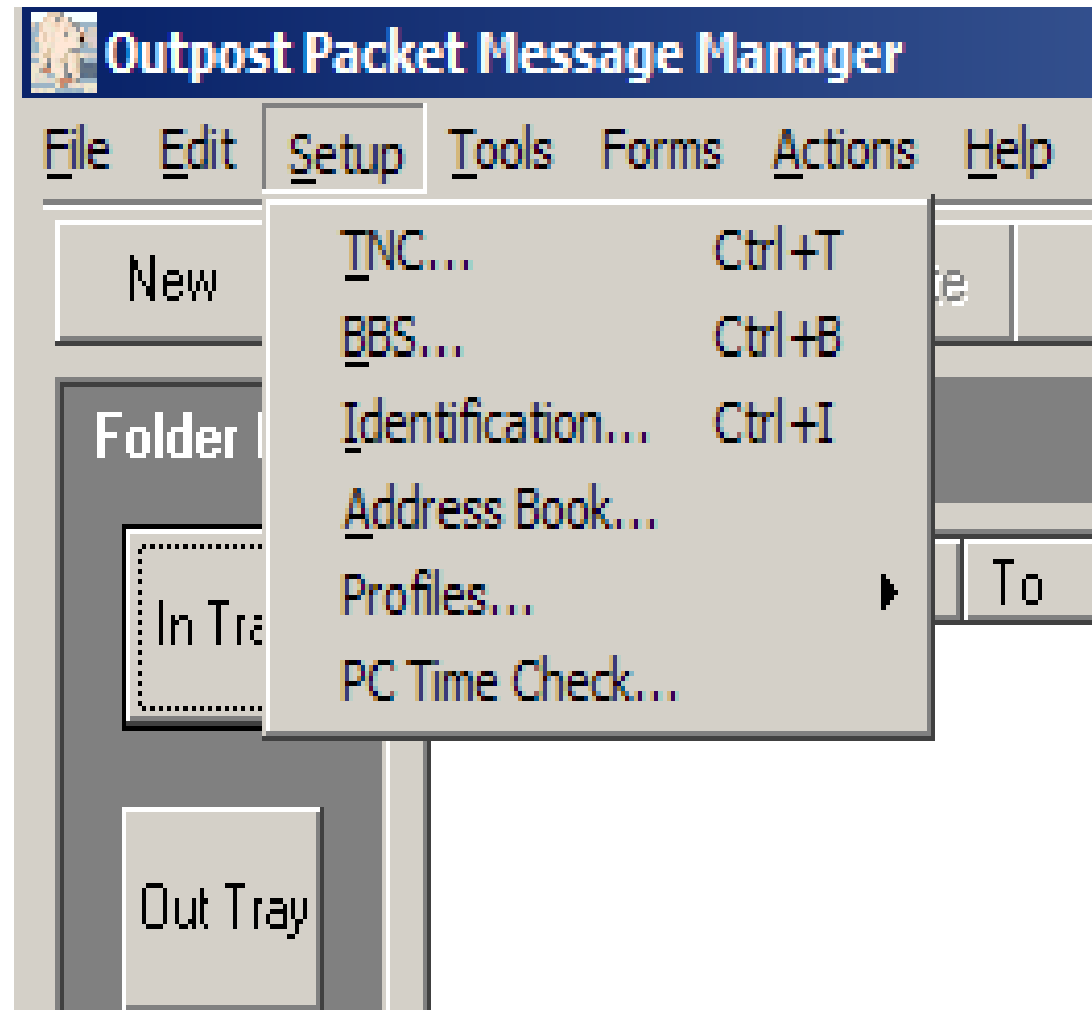
SCCo Settings Are In Unique Named Files

- Standard settings file names are unique
  - *Outpost*.profile
    - User settings overwritten
  - *XSC_<tnc name>*.tnc
    - COM port settings are maintained
  - *XSC_<BBSname>*.bbs
    - User settings overwritten
- SCCo Packet Installer overwrites settings in SCCo provided files
- User-created profiles, BBS setups, and TNC Setups are maintained across upgrades

User-created Settings

- You may create your own profiles, TNC setups and BBS setups
  - Examples: Extra profile to select backup BBS and TNC; extra TNC setup to add
  - XMITLVL for different radio; extra BBS setup for non-SCCo BBS
- Previously: user-created BBS and TNC setups were lost during upgrades
  - No longer the case
- Be sure to use a different file name for your settings
  - Examples

    Herman_frankenstein.tnc,

    W6XLR4_mockingbird.bbs

User-created Settings

New profiles are created with a copy of the existing settings
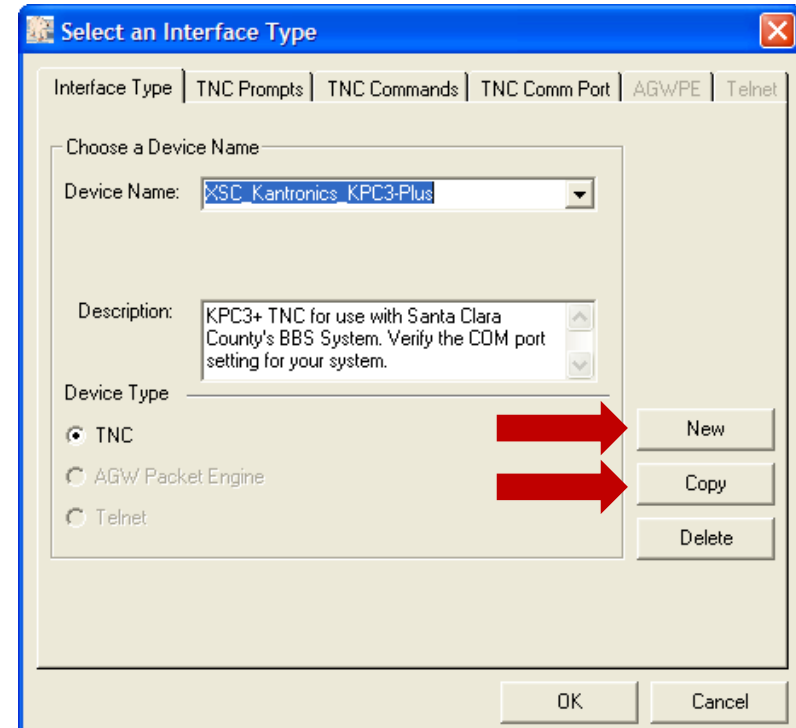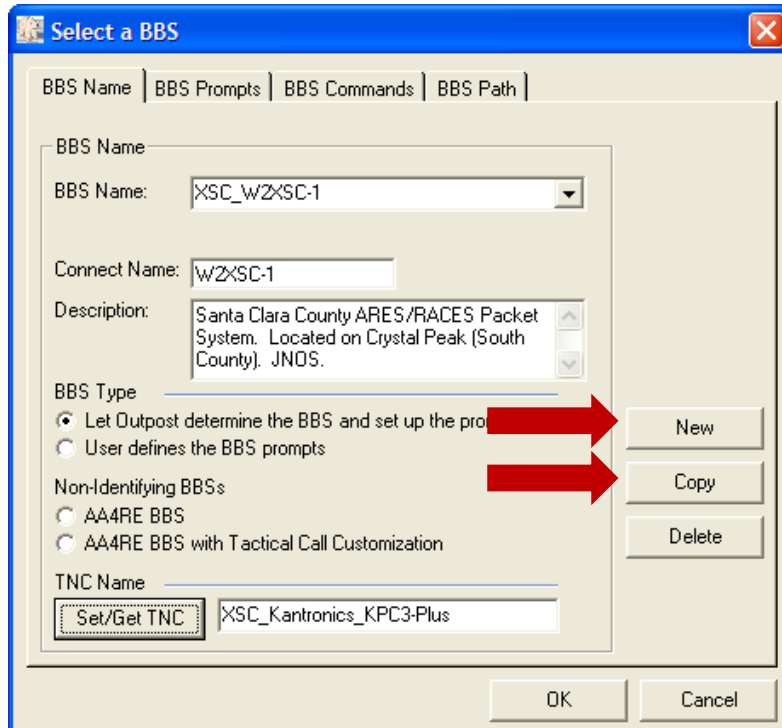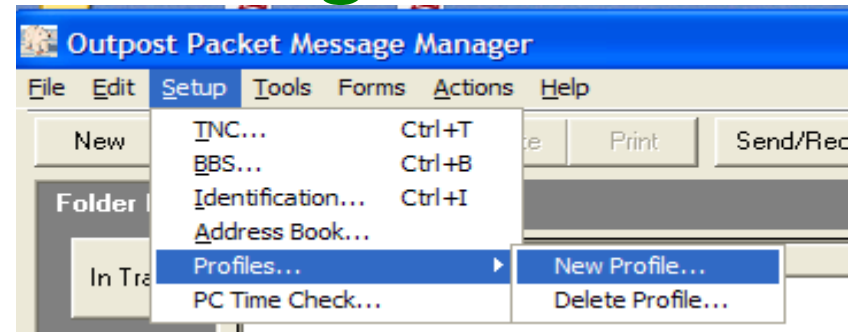
For BBS and TNC setups, best to use the Copy function to a new, user oriented name

BBS Settings Command List

- Commands can be added to insure proper BBS settings during and after connecting

- Can use SCCo BBS as a starting point
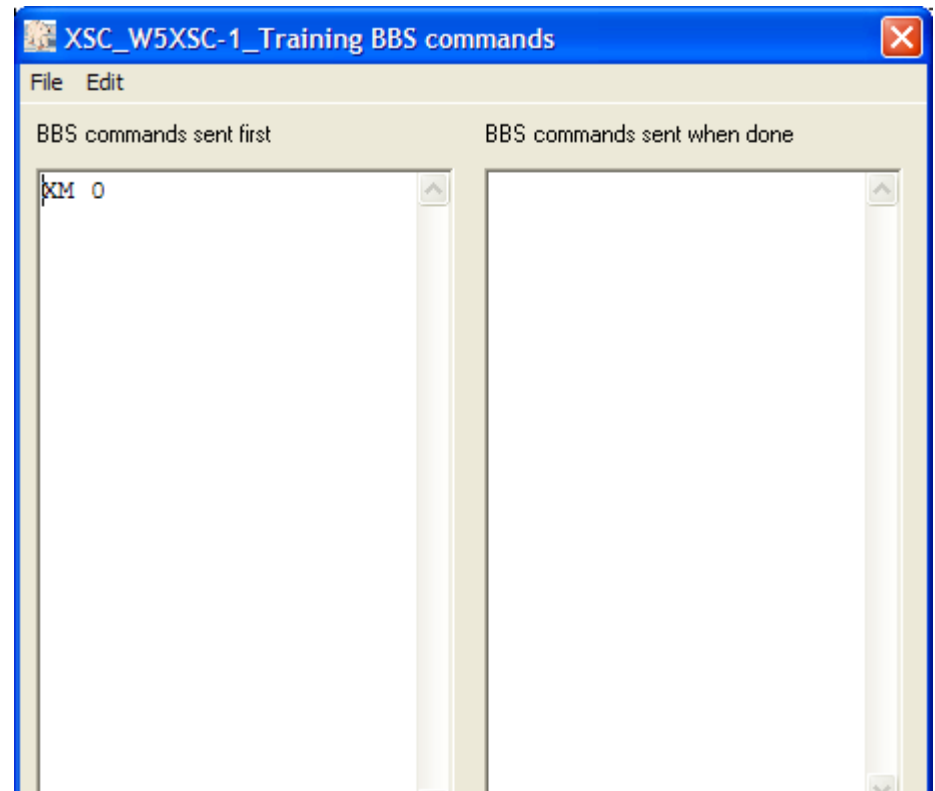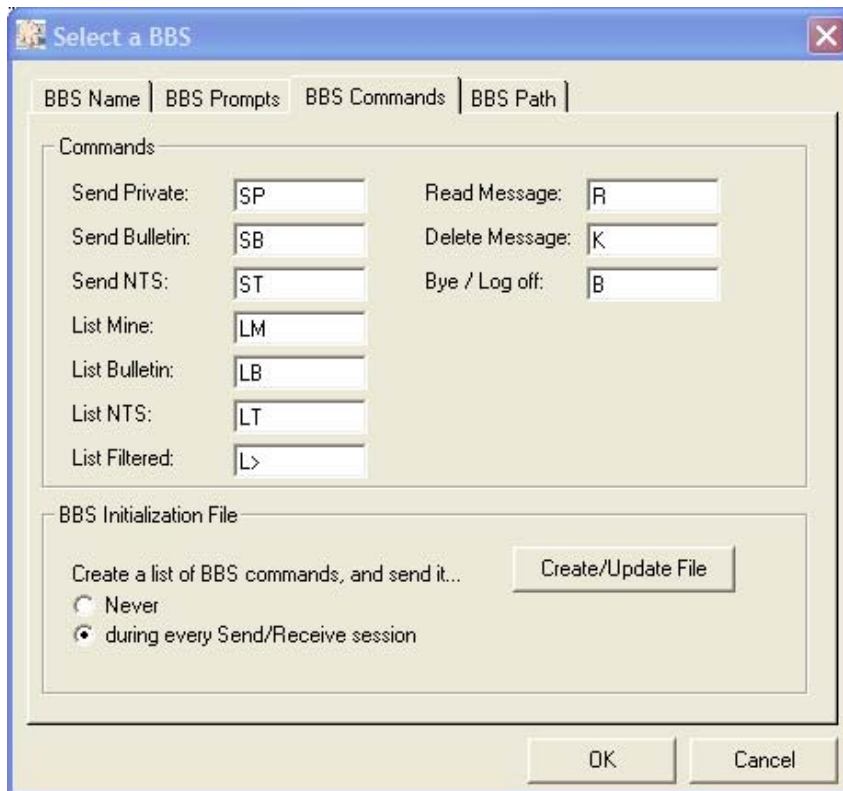
TNC Settings Command List

- Commands can be added to insure proper TNC settings during and after connecting to a BBS

- Can use SCCo TNC as a starting point
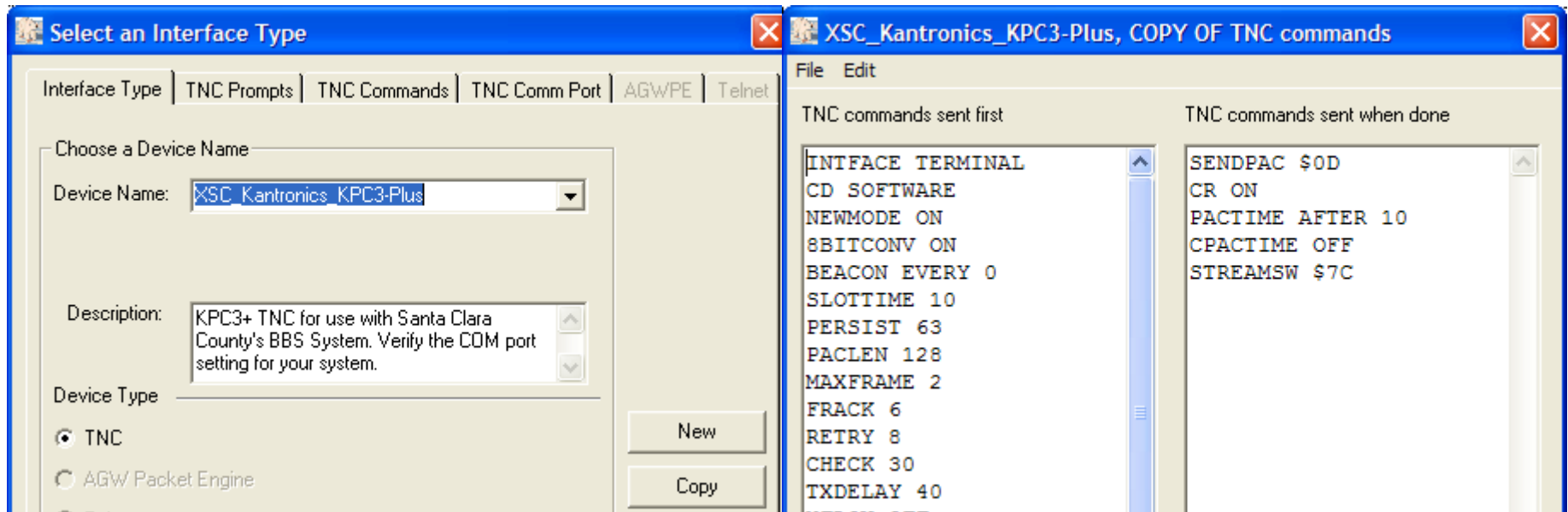
- TNC recommendations for SCCo BBS are on web site

Message Numbering

- P suffix is added to all inbound and outbound messages
  - Plain Text
  - PACForms

- Message Number
  - Global
  - By Profile

- Ex:
  - Personal Profile – 1000…
  - Drill Profile – 2000…
  - Event Profile – 3000…

Message Settings

New Messages | Msg Numbering | Replies/Forwards | Tracking | Deleting | Adv

Outbound Message Identification

☑ Add message number to the Subject Line for outbound messages
- ○ without hyphenation... "LR4123P: ... "
- ● with hyphenation... "LR4-123P: ... "
- ○ with DateTime Format... "LR4141202224403P: ... "

☑ Use Global Message Number (Profile-independent)
☑ Add message number suffix

Inbound Message Identification (Local ID)

☑ Assign a local message number to inbound messages (local use only)
standard format... "LR4-123P"

Edit Subject Line Identifier values

OK | Apply | Cancel

Known Issues

- Global message number
  - Changes to global message number are not saved if set via menu path:

    Tools > Message Settings > Msg Numbering >

    Edit Subject Line Identifier Values > Global Variables >

    Next Message Number

  - Workaround: Use menu path:

    Tools > Report Settings> Global Variables

- Printouts always go to system default printer
  - Workaround: Set default printer in Windows printer settings

- Improvements continue to be made

Outpost - A Closer Look

Message viewing

- Supports viewing, printing, deleting or saving a message to a local file
- Reply and Forward message formatting

- How?
  - Highlight Message
  - Press "Open"

  - Or double-click on the message
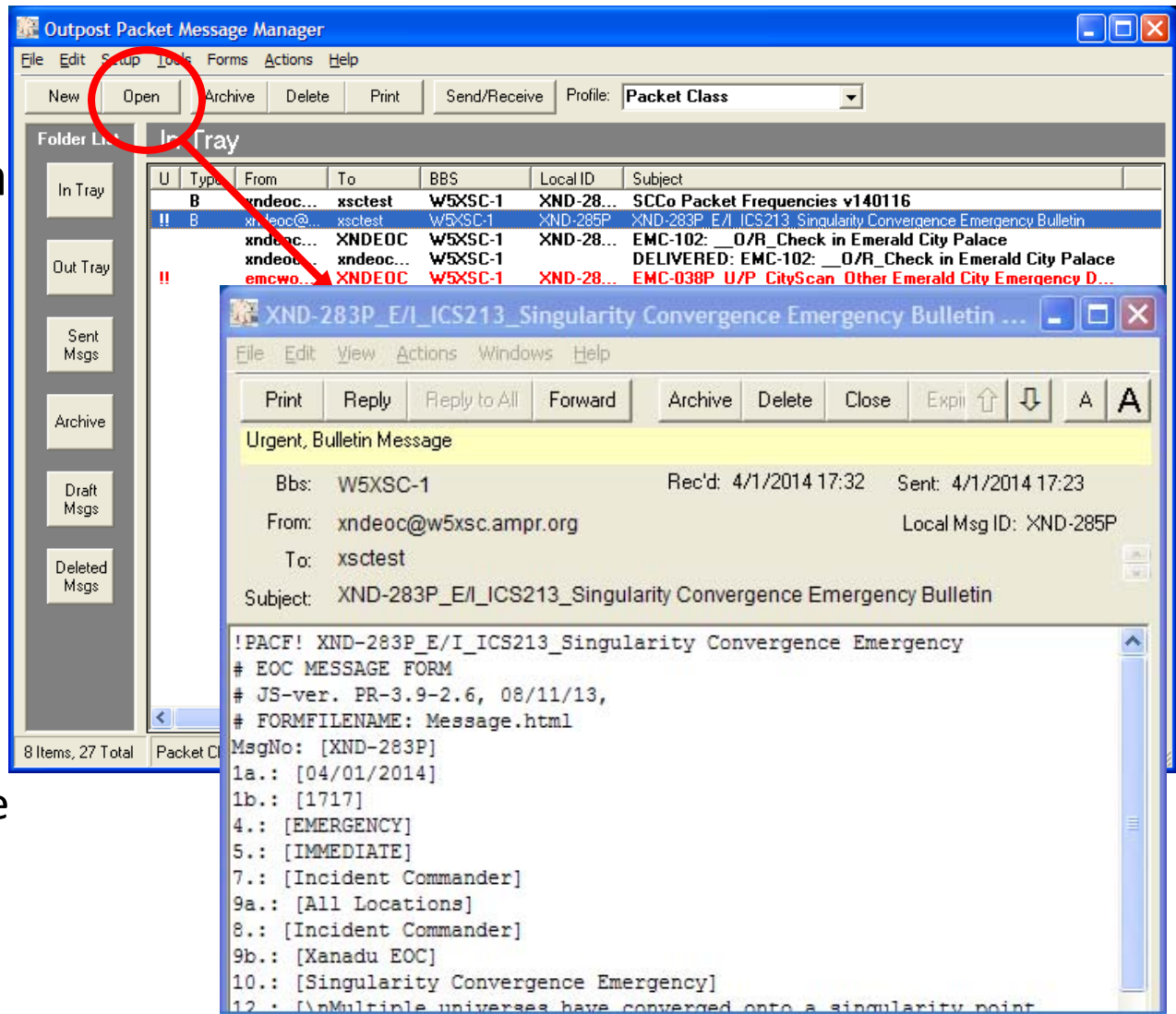
Viewing Message Navigation

- Up and Down arrows on message forms allow easy movement to previous or next message

- No need to close message, then open next message

Previous Message

Next Message
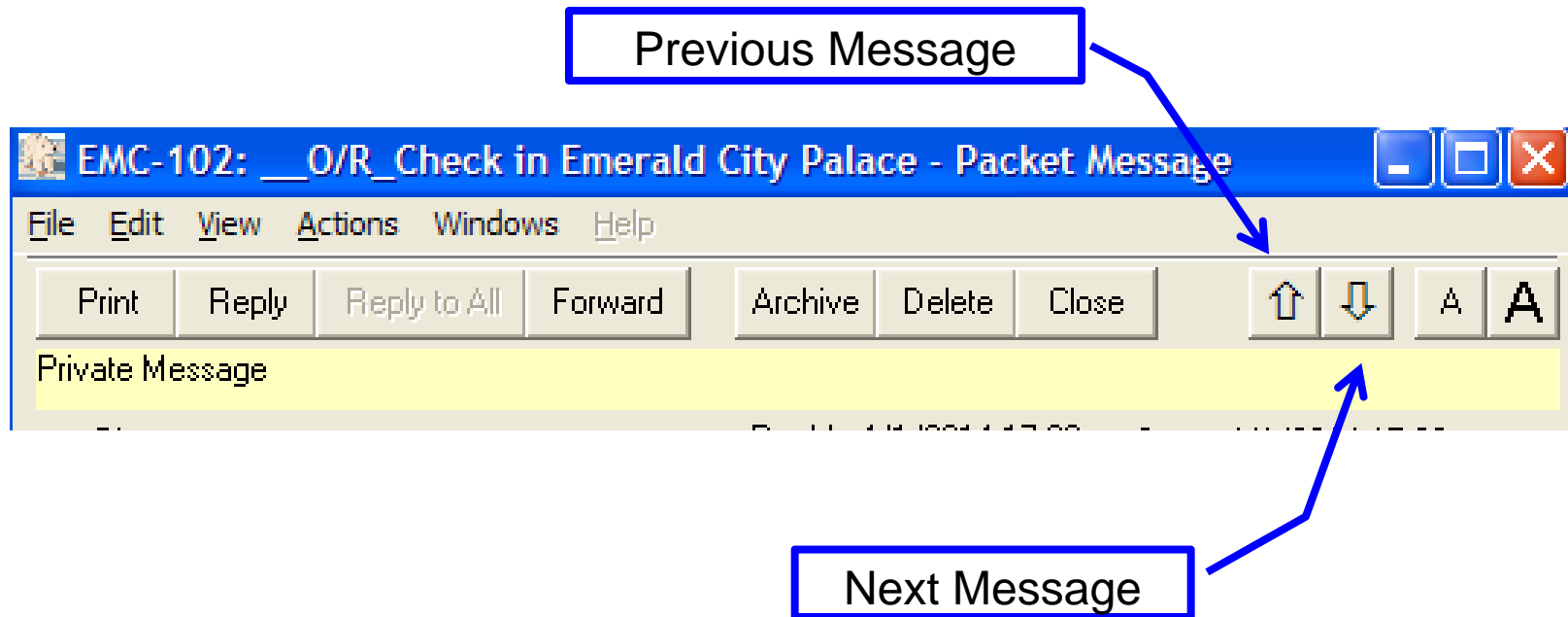
Creating Messages

- **Direct entry**

  - Allows cursor placement within the text field

  - Supports TAB characters (cntl-tab) thereby reducing character count
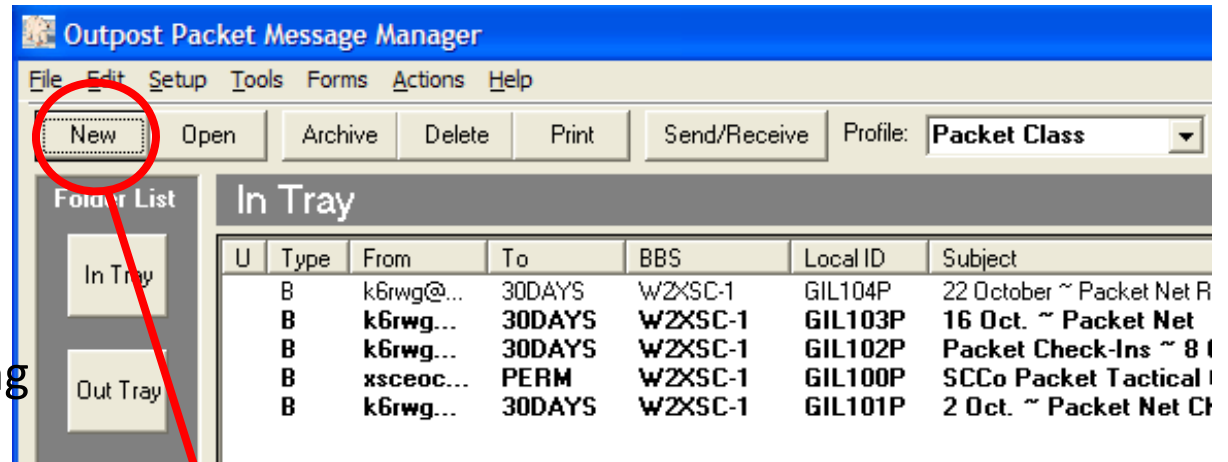
- **Other entry methods**

  - Cut and Paste from other apps, like Excel

  - Allows text files to be directly imported into the message form
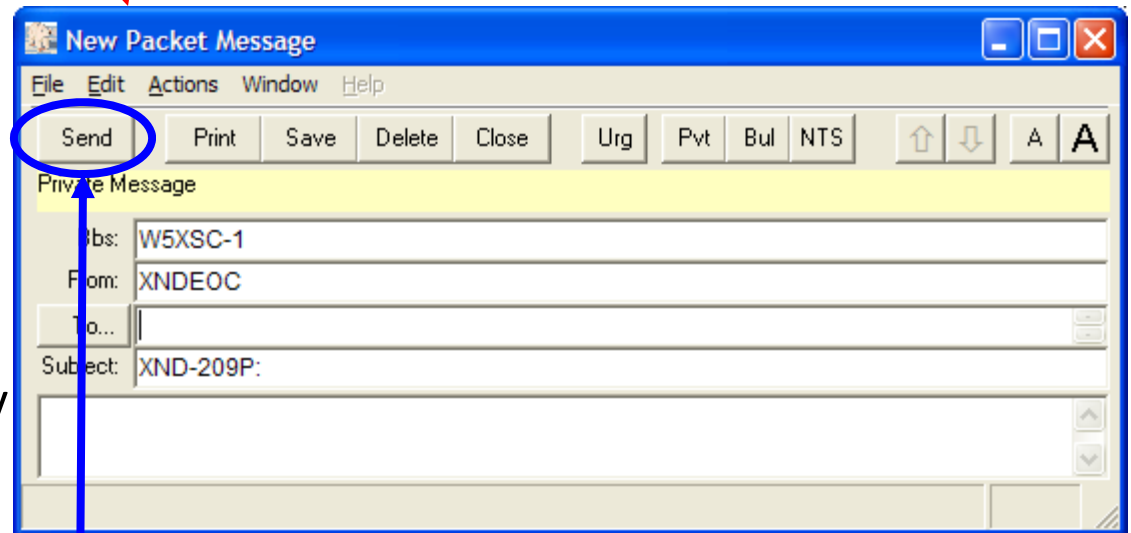
Send button moved

Message Size

- Message size limit was increased
  - From 10,000 to 65,535 characters
  - Character counter appears in bottom right of message window
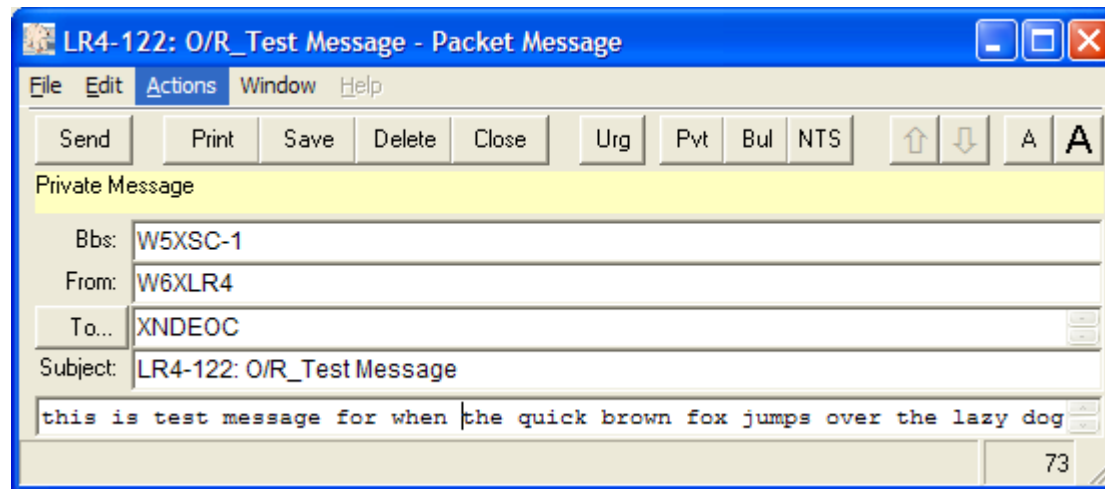
- **Take care when preparing large messages**
  - **The RF channel is shared**
  - **Limit messages to the minimum required**

PacFORMS

Introduction to PacFORMS

- What are PacFORMS?
  - Web pages with fill-out form fields that are designed to provide text data that can be transmitted by Packet
    - Web pages are "built" using HTML
  - Web pages also include JavaScript which is used to extract the text information from the forms
    - Generates a window or string of ASCII text data that contains the form information
    - Text data has a special format for transmission by Packet

- PacFORMS was developed to facilitate the transmission of Santa Clara County forms via packet radio
  - Minimizes data actually sent
  - Web tool to "fill in the blanks"

County Use of PacFORMS

- Santa Clara County PacFORMS contains these public forms
  - XSC City Scan/Flash Report – Reports city emergency situation status to county OES.
    - HTML File: city-scan.html
  - XSC Logistics Request Form – Requests specific resources needed to support an emergency.
    - HTML File: EOCLogisticsRequest.html
  - XSC ICS-213 Message Form – ICS 213 adapted for Santa Clara County to transmit messages.
    - HTML File: Message.html

- These forms are installed automatically when PacFORMS is installed
  - Additional forms may be provided by your EC

PacFORMS Are Accessible From Outpost

XSC ICS 213 Message Form

- Standard ICS 213

- Form should come to you already filled out
  - Applies to City Scan and Logistics, as well
  - If you have to fill it out, have the originator review and initial it

- If you are doing a drill
  - Fill in the blanks just like paper version

- No need for 5 words per line

- Replies to a previous message must have that message number in the reference line

- Make sure the header info is filled out

- Outpost will handle the numbering

XSC EOC Logistics Request

EOC Logistics - Supply and Services Request Form
JavaScript Version PR-4.0-2.4 for Amateur Radio Packet Transmission, 10-27-2014 - PsoRELEASE 4.0
(For the manual saving of the ASCII output, this form is best used with Microsoft Internet Explorer)

- Used to request material, equipment, and personnel

- Message always goes to Logistics

- Should answer
  - What do you need
  - Who needs it
  - Where do you need it
  - When do you need it
  - How long do you need it
  - How do you get there

91

XSC City Scan/Flash Report

- Used to report city status and incidents to report
- Always goes to Planning
- Always Urgent priority

What Really Gets Sent
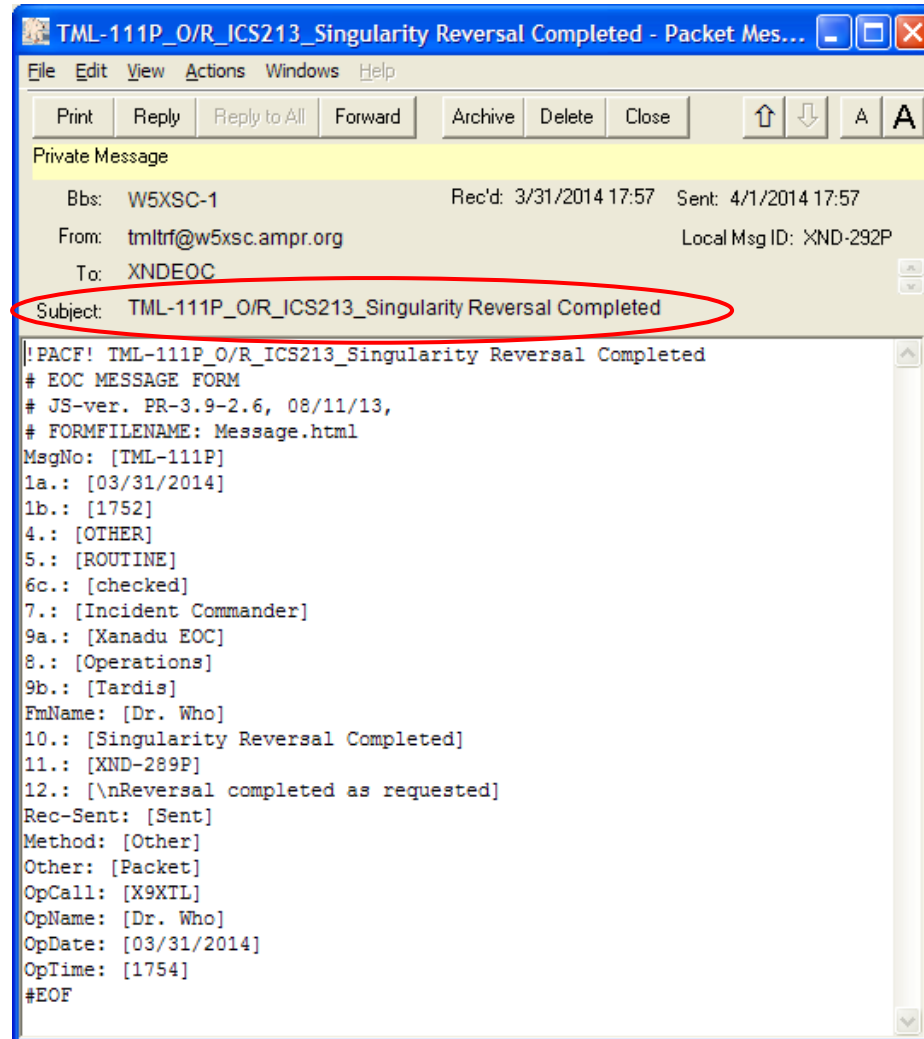
PacFORMS creates subject line automatically

Generic ICS-213 Form

- Use XSC ICS-213 Message Form in Santa Clara County
- Use Generic ICS-213 Message Form elsewhere
  - Communications to/from Regional EOC
  - Communications to/from other counties
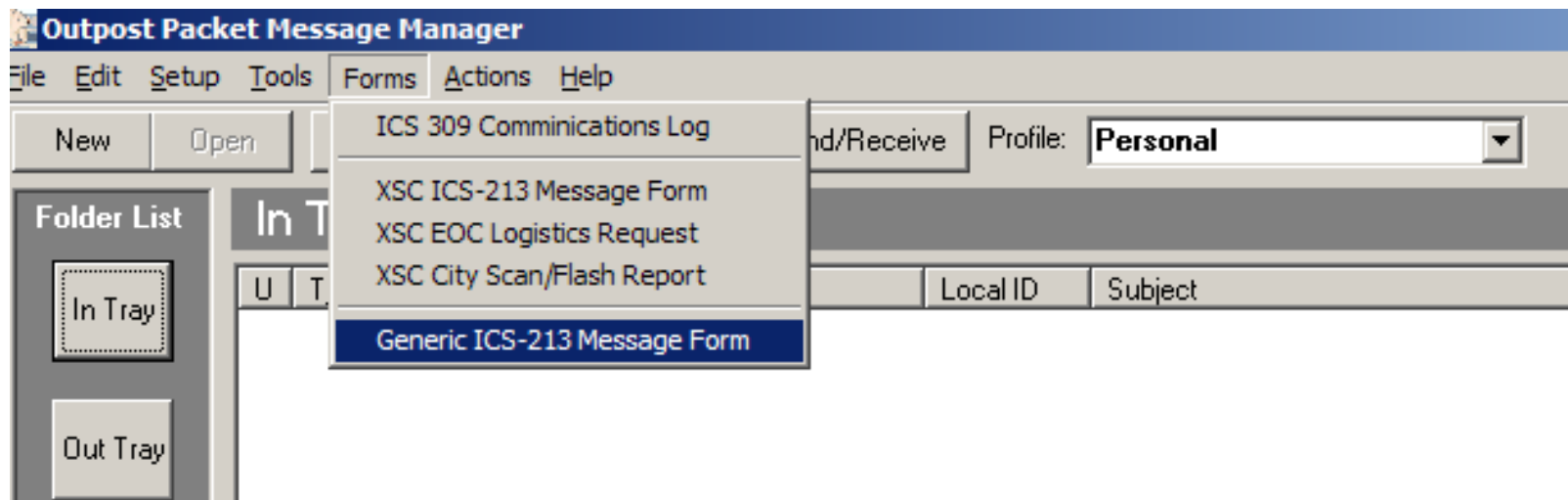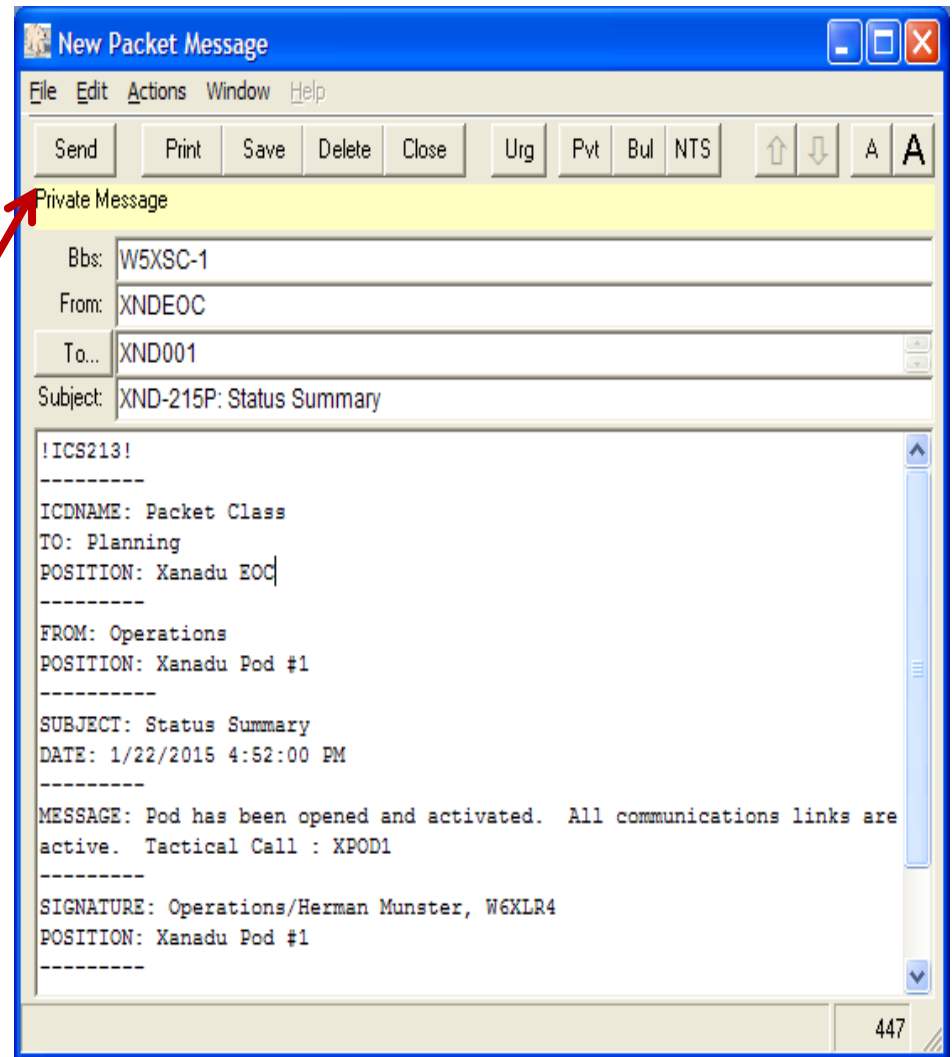
Generic ICS-213 Form Sample

- Generic form when SCCo form is not needed
- To use
  - Click *New*
  - Fill in the blanks
  - Click *Send*
  - Click *Close*
    - Outpost message is created similar to PACForms

Generic ICS 213 Outpost Message

- Form is converted into a simple text message
  - Not PACForms compatible
- Add *To:* information
- Send like a text message
  - Click *Send*

LET'S GO TO WORK

Setup Station

- Identify operating position and antenna location
    - Be careful of equipment placements
    - Foot traffic patterns
    - Doors closing on coax cable
    - Do you have enough room to work?
        - Paperwork
        - Logging

- Erect Antenna and connect to radio
- Connect radio, TNC, PC, and power supply

Activate Station

- Power everything up
- Radio
  - Set radio to correct channel/frequency
  - Adjust squelch to minimum (constantly open)
  - Adjust volume to an appropriate level
  - Should hear static and packet bursts
- TNC
  - Power light on
  - RCV light on when strong packet burst heard
- PC
  - Open Outpost and verify settings
    - Operator Name
    - Operator Call
    - Tactical ID
    - Profile, BBS, TNC selections

Verify Station Operation

Test BBS Connection

- Open Outpost
- Click "Send/Receive"
- Should observe on TNC
  - XMIT light on and radio transmitting
  - RCV light on when packet burst heard
  - Can hear packets in another radio

Send a Test Message

- Send test message to self
- Review received bulletins
- Report to site/radio room supervisor
- Begin operations
  - Send Check-in message
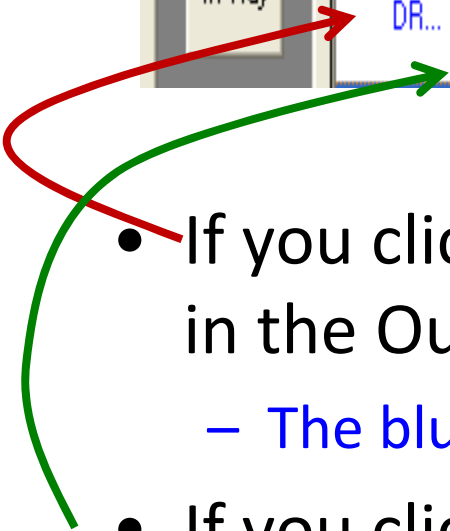
Outpost Workflow – How it Gets Done

1. Press "New" to create a new message
2. Compose the message.
3. Press "Send" – message is moved to Out Tray
4. Press "Send/Receive" to transmit/receive msgs
   - Sent messages are moved from **Out Tray** to **Sent Msgs** folder
   - New messages are displayed in bold in **In Tray**
5. Read and handle new messages
6. Delete messages as needed
   - Deleted messages moved to Deleted Messages folder

If you think there is a problem with a message, refer the message to the Shift Supervisor for resolution

Watch Out for Drafts

U	Type	From	To	BBS	Local ID	Subject
	DR...	XNDEOC	tmltrf@w...	W5XSC-1		RE: TML-111P_O/R_ICS213_Singularity Reversal Completed
		XNDEOC	xsctest	W5XSC-1		XND-283P_E/I_ICS213_Singularity Convergence Emergency Bulletin

Folder List — Out Tray — In Tray

- If you click "SAVE", the message is saved as a DR(aft) in the Outbox and will not be sent
  - The blue highlight shows that it is a DRAFT
- If you click "SEND", the message will be saved without a type designation
- Check the OUTBOX after a SEND/RECEIVE to make sure the messages were sent

Tracking activities and message traffic

RECORD KEEPING AND LOGGING

Summary of Logging and Record Keeping

- Everyone fills out a 214 Unit Activity Log (ICS 214-SCCo)
  - Start it when you get your assignment (before you leave home)
- Everyone signs in/out on a 211A Communications Check-in (ICS 211-SCCo)
- Packet operators may also fill out 309 Communication Log (ICS 309-SCCo) for the packet station
  - Does not replace the need to maintain a 214 Unit Activity Log
  - May use ICS 309 feature of Outpost
- Start your log(s) as soon as you check-in to your assignment
- Must be legible!
- Hand in your logs, notes, etc. at the end of your shift

ICS-309 Communications Log

- Outpost now produces an ICS 309 communications log

- The log can be automated to print on a regular interval

- Configuration Options:
  - Reporting period, content, sort, layout, output destination

- Instructions:
  - "How to Configure Outpost for Automated ICS-309 Printing"

http://www.scc-ares-races.org/packet/docs/How_To_Outpost_Auto_ICS309_v100911.pdf

ICS 309 Communications Log

ICS 309

COMMUNICATIONS LOG	TASK # XND-14-04/01T	Date/Time Prepared: 04/01/14 17:58
Operational Period: 04/01/14 17:20 to 04/04/14 23:59	Task Name: Packet Class Demo	
Radio Operator Name: Xanadu Xack	Station ID: Xanadu EOC	

LOG

Time	From	To	Msg ID	Local ID	Subject
04/01 17:23	XNDEOC	XSCTEST			SCCo Packet Frequencies v140116
04/01 17:23	XNDEOC	XSCTEST	XND-283P		XND-283P_E/I_ICS213_Singularity Convergence Emergency Bulletin
04/01 17:32	XNDEOC@W5X...	XNDEOC	EMC-102	XND-284P	EMC-102: __O/R_Check in Emerald City Palace
04/01 17:32	XNDEOC@W5X...	XSCTEST	XND-283P	XND-285P	XND-283P_E/I_ICS213_Singularity Convergence Emergency Bulletin
04/01 17:32	XNDEOC@W5X...	XSCTEST		XND-286P	SCCo Packet Frequencies v140116
04/01 17:33	XNDEOC	XNDEOC@W5X...			DELIVERED: EMC-102: __O/R_Check in Emerald City Palace
04/01 17:42	XNDEOC@W5X...	XNDEOC@W5X...			DELIVERED: EMC-102: __O/R_Check in Emerald City Palace
04/01 17:42	EMCWOZ@W5X...	XNDEOC	EMC-038P	XND-287P	EMC-038P_U/P_CityScan_Other Emerald City Emergency Declared: yes
04/01 17:42	XNDEOC	EMCWOZ@W5X...			DELIVERED: EMC-038P_U/P_CityScan_Other Emerald City Emergency Declared: yes
04/01 17:49	XNDEOC	TMLTRF	XND-289P		XND-289P_E/I_ICS213_Singularity Reversal Requested
04/01 17:49	MBHGGG@W5X...	XNDEOC	MBH-218	XND-290P	MBH-218: __O/R_CityScan_Other Mockingbird Heights Emergency Declared: no

WRAP UP

For Your Information

- Download bulletins into Outpost
  - Store in Archive folder to save for reference

    Frequencies

    Tactical Calls

    Subject Line Format

    Weekly Check In Schedule

- Force a one time bulletin download
  - Actions -> Force one-time bulletin retrieve

For Your Information

- These documents are recommended for your Go Kit
    - Packet Frequencies and BBS Assignments
    - Outpost Configuration Settings
    - Message Addressing
    - Standard Message Line Format

- Download and print out a hardcopy

http://www.scc-ares-races.org/packet.html

Stay Current, Stay Informed

- Visit the County web site often

- Check the Announcement space

- Check the Packet page

- Check for updates often

- Take personal responsibility for keeping yourself and your equipment up-to-date

- Join the Yahoo SCC-Packet group

  http://groups.yahoo.com/group/scc-packet

Keep your equipment, software, and yourself up to date

HOMEWORK!

- Complete the following tasks before attending the next class.
  - Familiarize yourself with entire SCCo ARES/RACES Packet web page
    - http://www.scc-ares-races.org/packet.html
  - Join the scc-packet Yahoo group
  - Install Outpost and review the settings menus
  - **Read and Understand the "Packet Network Addressing" web page**
    - **http://www.scc-ares-races.org/packet/packet-addressing.html (linked from main packet page)**
    - **Use the scc-packet Yahoo group for questions**
  - If you have a packet station (Optional Extra Credit)
    - Connect to your primary BBS and send yourself a message
    - Download, save, read and understand the bulletins
      - Automatically retrieved by Outpost (tactical calls, frequencies)
    - Check in to the Mon/Tue packet net
      - Information on procedures is on SCCo packet web page

Summary

- You should now understand
  - The role of a Packet Operator Type III
  - What packet is and why we use it
  - The Santa Clara County BBS network and BBS assignments
  - How to set up the baseline packet station
  - The use of Outpost and PacFORMS
  - How to record your activities

- Next Class – Packet III B
  - Troubleshoot a packet station
  - Operating Procedures
  - Bulletins and Message addressing
  - Send and receive PacFORMS messages using Outpost
  - Bring your packet station if you have one
    - Battery and Dummy Load
  - A laptop with wireless will also work

Thank You!

Questions, comments, suggestions?

KZ6O@arrl.net

REFERENCE INFORMATION

Selecting a Radio for use with Packet

- For best performance, you need a mobile radio
  - 25W or more and TALL antenna STRONGLY recommended
    - Reduces "Hidden transmitter problem"
      - Can't hear others/others can't hear you; creates DOUBLES!
  - Dual-receive nice to monitor command channel
    - Or single band radio and use HT
  - Data Connector preferred
    - Consistent transmit/receive audio levels
    - Simultaneously monitor packet traffic on speaker
    - Audio to TNC not affected by volume control
    - Typically a 6 mini DIN

Radio Selection

- ## Single Band
  - Can be dedicated to packet only
  - Single band radios with a TNC data connector are RARE

- ## Dual Band
  - Packet plus voice channel
  - Dual Band/Dual Receive capability
  - More costly
    - $300 - $700
  - Some commercially derived dual band radios do not have a data connector

- ## Radios with built in TNC
  - Compact, convenient
  - Audio levels usually pre-set for optimum performance
  - Cost = Radio + TNC

TNC = Terminal Node Controller

- Implements AX.25 protocol
  - Manages AX.25 connections
  - Assembles / disassembles AX.25 packets
- Keys radio PTT
- May include additional functions
  - Personal BBS (PBBS)
  - Node or digipeater
  - APRS
  - Keyboard-to-keyboard functions
- May be implemented in hardware or software

Comparison of two popular TNCs
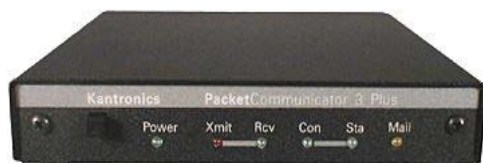
Feature	KPC-3+	PK-96
User Manual	Latest version easy to use	Well formatted, easy to use
Online Help	Yes	No (keep PDF manual on PC)
9600 Baud (not used very much)	No	Yes
Audio Level Adjustment	XMITLVL command, easier to set for multiple radios	Manual, via potentiometers
Carrier Detect via Software	Settable via command	Default mode
Command Options	Complete	More levels available; nice, but not needed for EmComm
Real Time Clock Chip	Yes (plug-in option)	Yes (plug-in option)

Note: For information only, no endorsement is expressed or implied. The above two TNCs are successfully being used in the SCCo network on a regular basis. Other TNCs may work equally well. Specifications and prices subject to change without notice.

Antenna Considerations

- Packet networks are simplex nets

- You must be able to hear EVERYONE else on the channel and they must ALL be able to hear you

    – If not, you WILL cause doubles

    – You may not hear the double, but the BBS WILL!

- Get your antenna up as high as possible

- Consult SCCo MAC F2 requirements for minimum recommendations:

- For base station, consider tri-bander (e.g. Comet CX-333)

Computer Considerations

- Types
  - Lots of "portable" types to pick from
  - Needs to run the Outpost application
  - Needs to be able to interface to the TNC

- Portability
  - Size, weight

- Readability
  - Screen size, non-glare

- Power efficiency
  - Needs to run for one hour without AC adapter
  - Most recent laptop type meet this requirement with internal battery
  - If needed, may use external 12v battery and travel adapter or inverter

- Avoid smart phones, non-Windows tablets (for now), …
  - O.K. for personal fun; not for serious EmComm support of a city/agency

Other Computer Considerations

- ## External Storage for backup, file transfer
  - USB Memory Stick (required)
- ## Printer
  - Portability
  - Fresh ink cartridges
  - Power
  - Interface

PC Software

- Core Applications
  - Windows (2000 or later recommended)
  - Outpost (latest county installer)
  - PacFORMS (latest county installer)
  - Web Browser
  - Terminal Software
    - PuTTY
  - Drivers for USB to serial interfaces
  - Notepad++ or WordPad
- Optional tools
  - An "Office Suite" - MS Office or Open Office